The Business Journal of Vegetation Management October 1978/$1.25

WEEDS TREES & TURF

Determining Tree Fertilizer Needs

Rain Tower Permits Comparison of Mulches

Identification and Control of Greenbugs

Aphids Feeding on Grass and Damage to Turf

PARK MANAGER PROFILE

The seed that's changing the face of America.

Pennfine Perennial Ryegrass

The biggest breakthrough in the greening of America began in 1970. That's when turfgrass specialists at Pennsylvania State University completed development of a remarkable fine-leafed perennial ryegrass with all the advantages of ryegrass. And none of the drawbacks. They called it Pennfine.

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Proven in tests. Among the nine perennial ryegrasses tested over a five-year period at University Park, Pennsylvania, Pennfine ranked finest in texture. Most resistant to disease. First in density and decumbency (low growth).

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Most importantly, Pennfine established a new standard of mowability. Some other perennial ryegrasses, cut with the same mower, left ragged, fibrous tops that quickly turned brown. Pennfine's softer fibers cut smooth and clean.

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Pennfine PERENNIAL RYEGRASS

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A lift-up hood makes an 850 or 950 easy to service. Adjustable, fully-cushioned seats make them comfortable. And behind these new tractors is your John Deere Dealer with an expert service staff, complete parts inventory, and a long-term commitment to keep them running like new.

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- 31 Posthole Digger
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- 30 Integral Plow
- 40 Rotary Tiller
- 45 Rear Blade
- 25A Flail Mower

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WT&T

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"I could sure use a rugged mid-sized rotary that really maneuvers."
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VIEWPOINT

Bruce F. Shank, Editor

The public parks system of the United States may face serious cutbacks if California's Proposition 13 and office-seeking politicians cause widespread reduction in public funds.

The success of local parks is evident in the two profiles in this issue (pages 35 and 42). Demand for convenient and inexpensive recreation increases steadily as more people realize the physical and emotional value of the park setting.

Nevertheless, two-thirds of park managers responding to our latest survey say park budgets are too low, by an average of 35 percent. Park managers are performing certain design, construction, and maintenance jobs on their own to save paying standard contractor rates.

If budgets are already at shoestring level, further cutbacks will seriously hinder maintenance of existing parks and eliminate construction of new ones. It appears that residential construction will continue at explosive rates and the pressure on parks will increase as more people live near them.

Meanwhile, politicians pretend there is fat in all government and promise tax cuts of 33 percent. Promising anything, hoping to fool a voting majority, many politicians ignore business facts of life which apply to government as well as the private sector.

Unfortunately, park directors have to bear the weight of bad performance, corruption, and incompetence of other government officials.

Up to now, park directors have been a relatively invisible group. In limited cases, park directors publicize what they can do. They act in response to public tastes in recreation, (such as hockey, bicycling, jogging, and handball), publicize the fact they are responsive, and consequently gain support for more park improvements. Image is vital to winning support for park bond issues.

The situation of parks simply cannot be combined with that of other areas of government. In the profile survey on page 31, we figure the cost per citizen per year for public parks is a mere $16. Take two people to Disney World and you've spent more than that.

The California situation is based upon a weakness in the laws of California, not the laws of the entire country. Real estate prices are escalating at 15 percent or more per year. If no controls are placed upon the rate of property tax increase, taxes will increase at the same rate.

Fifteen percent is not a good figure for other cost increases. Government should not expect 15 percent annual budget increases when most businesses operate at five to eight percent annual cost increases. Government should expect no more than businesses expect and controls have to be placed upon property taxes to limit it to what is actually needed.

Proposition 13 was an overreaction caused by poor lawmaking in California. The proper move would have been for the state legislators to react to public outcry by limiting property tax increase to the five to eight percent range.

For current politicians stumping for election or reelection to say more drastic control measures are necessary is also overreaction and should not be rewarded with votes.

Another factor plays a significant role in park budgets. As seen in the Brooklyn Park, Minnesota, profile on page 35, if a community can generate matching funds and apply for Federal programs they can double their budgets and do fantastic things for residents with their parks. Knowing how to obtain federal and state grants is essential for park managers to maintain a progressive park system.

Park managers are facing tremendous challenges now and greater ones in the future. Professionalism in park management is essential for a community to build and maintain a quality park system. Local governments especially need to sell their parks to residents, get support from park users, and publicize any new programs.

If a city doesn't have a park manager, it should hire one and make the needed investment to keep its parks alive. If that is not feasible, consultants should be hired periodically to review the city park program and to keep it up-to-date with regard to services and available grant sources.

Finally, now more than ever, park managers should support their professional associations and demand these associations to provide needed information.

GREEN INDUSTRY NEWS

COMPANIES

Davey Tree to be sold to employe group

Ownership of Davey Tree Expert Co., Kent, Ohio, will be turned over to its employes, board chairman Alexander M. Smith announced last month.

The acquisition of control by the employe group is expected to be completed in early next year, Smith said. Davey has about 2,500 employes, is licensed in 45 states and expects to do about $50 million dollars worth of business this year, according to marketing manager Henry D. Schmid.

The sale to employes insures that the corporate offices and headquarters will remain in Kent.

The essential features of the plan involve an offer by Davey to repurchase outstanding common shares, the establishment of an employe stock ownership plan and trust, and the sale of common shares to the trust and to employes.

The price for the shares of Davey in these transactions is based on a value of approximately $9 million for the company.

Smith said: "The selling shareholders are pleased to be able to transfer control of the company to the employes who have done so much to make this successful leader in the tree and lawn care field." Davey Lawnscape Service is a division of Davey Tree which operates in eight cities in the midwest.

The major shareholders are getting along in years," he added. He said that most of the stock is owned by relatives of the founder and they did not want to turn it over to outsiders.

VARIETIES

New creeping bent released by Penn State

A new seeded creeping bentgrass designed for golf courses has been released by Dr. Joseph M. Duich of Penn State University.

The new bentgrass — "Penneagle" — has been in development 20 years.

Dr. Duich said that the new grass should be excellent for the entire course and offers the golf superintendent a grass that can be used for tees, fairways and greens. Penneagle is being grown by Penncross Bentgrass Growers Association, Salem, Ore., and will be marketed by the Tee-2-Green Corp., Kansas City, Mo.

The new bentgrass's attributes are listed as a tighter, more upright growing bent, that is finer-leafed than most bentgrasses. The broad genetic base offers greater disease resistance under a variety of climatic conditions.

The new grass is not overly aggressive but is competitive with *Poa annua*.

Development of the bentgrass began in 1958 with 158 vegetatively propagated bents, Dr. Duich said. From that broad base, 21 plants were selected for turf performance. These were selected in combinations of threes and tested for compatible flowering time. Some combinations were not satisfactory and eventually four sets of three plants each were put into turf screening to determine quality.

In 1963, 1965, 1969 and 1973, turf screening continued on the new variety and ultimately ended up with four parents to give the new grass a broad genetic base so that plants could withstand climatic differences. The new grass has been tested in a seven-state area with broad climatic variations and has also been under test in Canada.

COMPANIES

Gravely acquires Hahn assets

Clarke-Gravely Corp., Clemmons, N.C. has purchased the operating assets of Hahn, Inc.'s Outdoor Products Div., Evansville, Ind.

The Hahn division manufactures and markets rear-engine riding

Ferrari International, Inc. has completed its move to new corporate headquarters in San Marcos, California. President Harold Sankey said, "Our sales have doubled in the last three years and this new building will form the basis for our projected growth."

Landscape Contractor News

Landscape contractors top billion dollar mark

An accurate demographic sample of the Associated Landscape Contractor Association's membership has shown that the average commercial firm in the country has a business volume of $340,000. This average firm owns $122,000 worth of equipment, purchased almost $30,000 worth of equipment in the last 12 months and also purchased approximately $153,000 worth of supplies and materials during that period.

Categorized, a small contractor (under $½ million) had an average volume of $244,000, presently owns $77,600 worth of equipment and purchased $16,000 worth of equipment during the past 12 months. He purchased $71,000 in supplies during that period.

The medium contractor figures are $915,000, $150,000, $15,000 and $256,000, respectively. The large contractor figures are $3,440,000, $686,000, $225,000, and $1,057,000, respectively.

Extrapolated to cover the entire industry, an estimated 3200 firms who are primarily landscape contractors, total annual business volume was $1,084,000,000. Equipment purchased over the last year amounted to $89,600,000 and supplies were $490,000,000.

ALCA network to provide wage input

ALCA has set up a network of landscape contractors to provide some input into the Davis Bacon Prevailing Wage situation when a government landscape job is put up for bid.

Basically, what happened in the past was that, when the government had a job to let in a certain county, they would send a request to the local labor hall, asking them to certify to the Department of Labor the wages that had been paid for landscaping work in that county during the past 12 months.

That figure would often get distorted and a landscape contractor who bid the job under his usual wage scale would suddenly find that his bid had been accepted but that he had to pay a much higher wage than normal. The contractor can go in and renegotiate at that stage, but success is questionable.

ALCA has been able to get the Wage and Hour people at the Department of Labor to send them a copy of the prevailing wage request. They then contact one of ten regional people across the country who in turn try to contact someone who has actually performed landscape work in that county.

While that sounds good in theory, it doesn't always work, according to John Shaw, Executive Director of ALCA.

There is a problem in finding someone who has performed work in that certain county. And when you do find someone, there is always the question of whether he will fill out the form and return it to the Department of Labor, says Shaw. Many feel that it behoves them to maintain a low profile with all the government agencies running around that check on them.

Accepting the responsibility could prevent a "horror story" such as bidding a job, while planning to pay $4.00/hour and suddenly finding out you get the same money but have to pay $11.00/hour.

NLA survey finds guarantee confusion

A postcard survey by the National Landscape Association has uncovered considerable disparity in the meaning of growing season in guarantees. Consequently, consumers have little understanding of the term. It should be explained exactly what is meant by growing season during sales transactions, NLA advises.

mowers, walk-behind rotary mowers, snow blowers and rotary tillers.

These assets will become part of, and the Hahn product line will be manufactured by the Gravely Division, a manufacturer of lawn and garden tractors.

Lloyd Hahn will act as full-time consultant to Gravely. The acquisition of the Hahn assets allows Gravely to become a full-line producer of lawn and garden equipment.

The present distributor organization for Hahn will continue to distribute the line.

RECREATIONAL TURF

Symposium is set on wastewater irrigation

"Wastewater Irrigation of Recreational Turf" is the topic of a two-day symposium Nov. 12-14 at the Arlington Park Hilton outside of Chicago.

The conference is a joint venture of the U.S. Golf Association Green Section, the American Society of Golf Course Architects (ASGCA) and the National Golf Foundation (NGF). More than 300 persons are expected to attend.

For further information, contact: Al Radko, national director, USGA Green Section, P.O. Box 1237, Highland Park, NJ 08904, 201/572-0456; E. Larry Packard, president, ASGCA, 11 S. LaGrange Rd., LaGrange, IL 60525, 312/352-2113; Don A. Rossi, executive director, NGF, 200 Castlewood Dr., N. Palm Beach, FL 33408, 305/844-2500.

EQUIPMENT

Ransomes, Wisconsin in new venture

England's Ransomes Sims and Jefferies, Ltd. has acquired equity interest in Wisconsin Marine, Inc., Lake Mills, Wis, according to Wisconsin Marine president Dane T. Scag.

Ransomes is Europe's largest manufacturer of professional grass machinery. The company manufactures reel-type machines ranging in size from 20 inches to 15 feet.

Wisconsin Marine has been a manufacturer of snow thrower equipment for more than 20 years. In 1974 the company introduced a line of commercial rotary mowers under the trademark "Bob-Cat." Ran-

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The 2300 looks like a compact. But the only thing small about it is its size.

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- **A 4-way, fully hydraulic 57" backfill blade is standard. And so is the hydraulic manifold so quick-connect hydraulic tools can be used in a matter of seconds.**

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GOVERNMENT UPDATE

Small businesses exempted from OSHA logs

Small businesses would no longer have to keep logs about occupational injuries or illnesses under an agreement reached in a congressional conference committee on the Small Business Authorization Bill.

Businesses with 10 or fewer fulltime employes would not have to keep the logs for the Occupational Health and Safety Administration unless the company owner was part of a survey of small businesses.

A committee staffer who worked on the bill said, "Businessmen should like this provision because we know they really hate to keep records."

Another provision of the amendment to the Small Business bill would prohibit OSHA from imposing civil penalties against a company with 10 or fewer fulltime employes on first-time OSHA inspections, which found 10 or fewer nonserious violations.

The conference committee report must be voted on by both houses and signed by the president before becoming law. Congress is expected to act on the legislation before the session recesses in October.

Although the amendment would limit some of OSHA's regulations, some congressmen felt the bill did not go far enough.

U.S. Sen. Dewey Bartlett (R-Ok.) proposed a tougher amendment which was defeated in the conference committee.

One of the senator's aides said, "Because the amendment says, '10 or fewer violations,' I think you'll see a lot of inspections where they find 11 violations. Sen. Bartlett will vote against the bill, I think."

FIFRA approved by Congress

With the passage of the Federal Insecticide, Fungicide and Rodenticide Act by both Congressional houses, the bill is expected to be signed by President Jimmy Carter.

Congressional staffers, who worked on the bill, expect the president's approval because the Environmental Protection Agency worked closely with the drafting of the bill.

"We worked so closely with EPA that it is unlikely there will be any problem," said a spokesman for U.S. Rep. Floyd Fithian (D-Ind.). Fithian drafted amendments to the bill.

An EPA spokesman said, "While we don't agree with everything in the bill, we are not going to ask the president to veto it."

The bill was passed by voice vote in the House on Sept. 19 and in the Senate on Sept. 18.

FIFRA would make states the primary enforcers of the law rather than the EPA. It would make these exceptions in the applications:

—using a pesticide at less than label concentration;

—mixing pesticides with fertilizer not specifically prohibited by the label;

—applying a pesticide for a target pest not listed on the label providing the application is to a labelled crop, animal or site and the label does not specifically prohibit use against that target pest;

—using a method of application not listed on the label.

DBCP restrictions made permanent

The Environmental Protection Agency has made permanent its temporary restrictions on the pesticide Dibromochloropropane, DBCP, which is used on lawns, golf courses and ornamentals.

DBCP is used against nematodes. The permanent restrictions are subject to a hearing, which must be requested by mid-October. Even if a hearing is requested the temporary restrictions would remain in force.

somes has been marketing a range of rotary mowers manufactured by Wisconsin Marine.

Wisconsin Marine sales have doubled each year since 1975 and projections show a continuing substantial growth for the next five years. To support expansion plans, the company recently acquired an option to purchase 40 acres in Johnson Creek, Wis. Construction will begin this year on a 90,000-square-foot manufacturing plant, which will more than double the present facilities.

SEED

Pickseed to market two new ryegrasses

Pickseed West, Inc., Tangent, Ore., has introduced two new turf-type perennial ryegrasses — Fiesta and Blazer — to be available for distributor sales this year.

The two new ryegrasses are characterized by fine texture, low growth, rapid germination, excellent seedling vigor, disease resistance and winter hardiness, the company said.

Fiesta is earlier in maturity and has a medium dark green color, while Blazer is a later variety with a truly dark green appearance.

Both of these ryegrasses perform well in bermudagrass overseeding, in turf mixtures, or in monoculture seeding, They are also available in Pickseed's new turfgrass mixture, Futura.

According to marketing manager Mike Robinson, Fiesta, Blazer and Futura will be distributed by Pickseed West, and also by Otto Pick & Sons Seeds, Ltd., Richmond Hill, Ontario.

MARKETING

Lofts establishes new sod division

Lofts Pedigreed Seed, Inc., Bound Brook, N.J. has established the Lofts Proprietary Turf Division to cater to the special needs of sod growers.

The new division will handle every available proprietary grass seed and blend, regardless of the producer, from its distribution points across the United States.

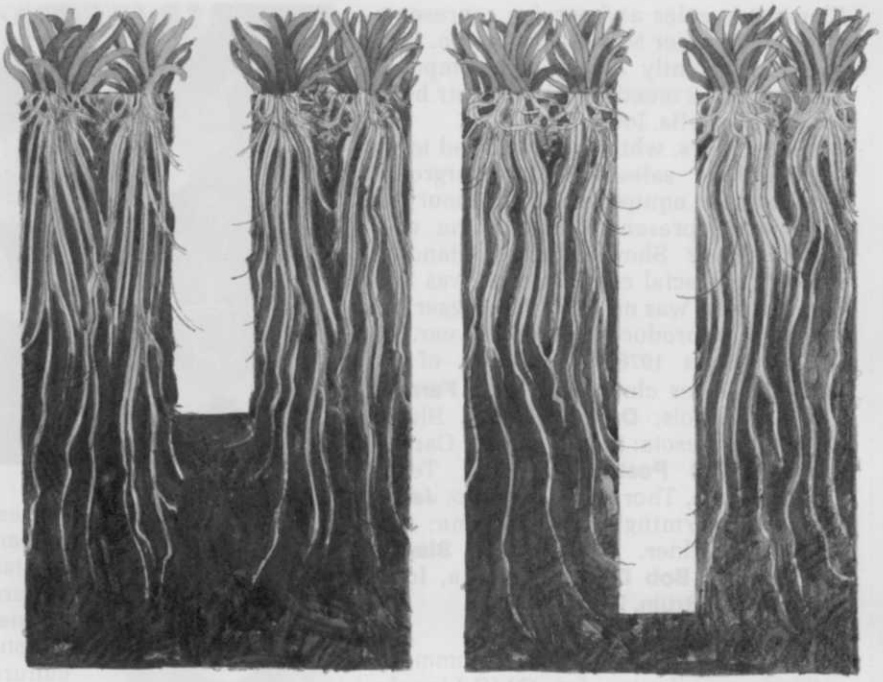
The new division will be staffed by men and women specially trained in every phase of sod production, with special backing by Lofts director of agronomy Richard Hurley.

Which aeration hole is better for your greens?

The answer, if you haven't already guessed, is the Greensaire II hole. And for good reasons.

One, it's deeper. The primary objective of aeration is to help air, water and fertilizer penetrate the soil. The Greensaire II removes cores up to 3″ deep, allowing these vital nutrients to reach the root zone where they're needed.

The fact that there are 36 of these deep holes per square foot means that you also remove more soil. This not only relieves the toughest compaction problems, but it also allows you to replace more of the old, depleted soil.



The Greensaire II hole is precise. It won't affect the roll of a golf ball, so your green is back in play sooner. You can aerate most greens in 45 minutes or less.

And when you use the Greensaire II, you can also use the unique Ryan Core Processor attachment. It catches the cores, separates good soil from debris, puts the good soil back on top, and bags the debris. You aerate, top dress and collect thatch in one operation.

If you want these same fine aerating qualities, but on a smaller scale, choose the Greensaire 16. It aerates a 16″ swath instead of a 24″, uses the same selection of tines and has a convenient windrow attachment that makes core removal easy.

Of course, like all Ryan equipment, these machines are built to last. So when you aerate, don't just scratch the surface. Get the deep penetration you need with the Greensaire II, Greensaire 16 and Core Processor.

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78-CUR-1

PEOPLE

Eleven top sales and service representative for Vermeer Manufacturing Co. were honored recently during the company's national sales meeting held at their headquarters in Pella, Iowa.

The honors, which are awarded to the top Vermeer salesmen of underground construction equipment throughout the U.S., were presented during the company's Silver Shovel Awards Banquet. Receiving special consideration was Rich Farrens, who was named "Top Digger", as the top sales producer during the year.

Named as 1978-79 members of the exclusive sales club were: **Rich Farrens,** Eureka, Illinois; **Dave Willinger,** Bloomington, Minnesota; **Dick Caldwell,** Carmel, Indiana; **Bill Poston,** Houston, Texas; **Glenn Nelson,** Thornton, Colorado; **James Walthall,** Birmingham, Alabama; **Lee Sparks,** Gardner, Kansas; **Don Slagter,** Pella, Iowa; **Bob Dieleman,** Pella, Iowa; and **Larry DeBruin,** Pella, Iowa.

Pyle

Sandi Pyle has been named communications coordinator for OMC-Lincoln, division of Outboard Marine Corp. Her new duties will include Yellow Page advertising, dealer field days, national trade shows and public relations. Ms. Pyle attended the University of Nebraska and is a member of the Lincoln Advertising Club. She has been employed in the OMC-Lincoln advertising department nearly five years.

Professor **George L. Good,** NY State College of Agriculture and Life Science at Cornell University, has been awarded the highest honor given by the New York State Nurserymen's Association, the 1978 Hall of Fame Award. The award was presented at the association's summer seminar recently held at the State University of New York Agricultural and Technical College at Farmingdale.

Good was recognized for his conspicuous contributions and meritorious service to the nursery industry through his research, teaching, and extension programs in nursery management and landscape horticulture. He was also cited for his leadership role in the college's ornamental horticulture pesticide certification program and for his contributions to the association's program for professional certification of nurserymen.

Stephen C. Wiest, a Cornell University graduate student, and his faculty adviser, Professor **Peter L. Steponkus,** have been presented with a national award for their outstanding research in ornamental horticulture. They jointly received the 1978 Kenneth Post Award for superior graduate student research in the field of floriculture, ornamental horticulture and landscape horticulture. The award was presented during the American Society for Horticulture Science in Boston.

Mills

Rainbird Sprinkler Manufacturing Corporation has recently created two new positions for its turf market. **Ken Mills** has been promoted to one as Turf Product Development Manager. He will be responsible for all new product development.

Carlyle "Cozz" Regele has been promoted to the other as Turf Product Technical Manager. He will handle the publishing of technical materials to support the field sales force and distributors. He will also update and improve existing turf products.

Regele

LESCO Products Division of Lakeshore Equipment & Supply Co. of Elyria, Ohio has appointed **Arthur D. Wick** as Northeast Regional Sales Manager. In addition to his previous responsibilities, Wick's duties will include sales activities in Northeast Ohio, Pennsylvania, New York, Connecticut, Massachusetts, New Jersey, Maine, New Hampshire, Rhode Island and Vermont.

Wick, with Lakeshore since 1970, has been the company's top salesman for the last three years.

Winter, summer — all year long the EXCEL HUSTLER shortens your hours.

All-season groundskeeping begins with the EXCEL HUSTLER tractor plus SeasonAll attachments and accessories like the Snow Thrower, ROPS Cab, and Dozer Blade.

Operators who mow with the EXCEL HUSTLER in summer swear by its easy handling and safety engineering. Instant response to fingertip hand lever control shortens their workday summer or winter. Dual hydrostatic drive with direct drive-wheel steering gives the EXCEL HUSTLER maneuverability no mower of like size can match or even challenge.

Low center of gravity; weight of machine plus operator centers over the drive wheels. This weight advantage keeps hold of slippery surfaces while Dozer Blade or Snow Thrower works on hard surface, gravel, or grass. Attachments lift hydraulically for easy transport.

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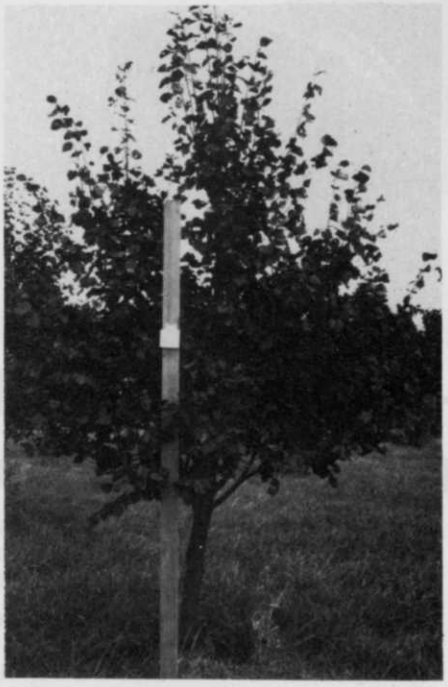
SPECIES, SOIL, LOCATION AFFECT TREE FERTILIZATION

By Elton M. Smith, Professor of Horticulture, Ohio State University

Many factors influence how much fertilizer shade trees need, such as species response, soil variation, and location. Recognizing differences in these factors will lead to proper fertilization and to improved performance of the trees.



Littleleaf Linden *(Tilia cordata)* six years after growth in poorly drained silt loam soil. Upper right: Fertilized. Lower left: Unfertilized.

Species

Are there differences in the fertilizer requirements between tree species and/or cultivars or can we treat most trees in a similar manner? Hopefully, one fertilizer could be applied on all tree species, at one rate, to simplify the process. Fortunately, this can be done, at least, on a local level with a few exceptions.

Trees showing signs of nutrient deficiency, often the case when the homeowner contacts the arborist, landscape or maintenance firm, do not always respond to a complete N-P-K fertilizer. Little leaf Linden, for example, will exhibit signs of nitrogen deficiency with symptoms resembling triazine (simazine, atrazine) herbicide toxicity. A complete fertilizer containing nitrogen will assist that species in restoring to normal foliage color. However, Oak trees with the typical dark green veins and yellow interveinal areas are usually in need of iron. The exact same foliar symptoms on Maples indicate a lack of manganese. A complete fertilizer, even with minor elements added, would quite likely not correct the problem of Oak and Maple. Therefore, it is important to realize that certain trees, particularly when grown out of their native habitat, may have specific nutritional needs.

Soils

Soils, as all professionals are aware, vary from sandy loam to clay loam with most soils, in landscape sites, of the silt to clay loam type. Understanding the differences between sand and clay in respect to fertilizer rates and frequency, cation exchange capacity, and pH are important. Recognizing too, that soils in landscape sites are often subsoil or a subsoil mixture, often heavily compacted from construction equipment and typically poorly drained create a whole new set of challenges for the tree care firm.

It's these variations in soil texture that cause industry representatives to "throw the suggested fertilizer guidelines out the window" and begin a new program.

Sandy loam soils with low cation exchange capacity (a measure of the capacity of soil to hold exchangeable cations: H^+, Ca^{++}, Mg^{++}, and K^+) will need to be fertilized with a low rate of fertilizer but at more frequent intervals.

The pH is a measure of soil acidity or alkalinity and its significance to plant growth is its effect on mineral element availablity. A pH of 6.0-7.0 in mineral soils represents that range in which most mineral elements are available to the largest degree. The most ideal pH range for the majority of trees in the north is 6.0-6.5. A very acid soil pH of 4.0 would result in deficiencies of certain elements

such as N, P, K and Mg and possible toxic levels of Fe, Mn and B. Highly alkaline soils of 9.0 would result in deficiencies of Fe, Mn, Cu, Zn, as well as N. Toxic release of K, S, Ca and Md are possible at such a high pH reading.

Subsoils often have a significantly lower pH than the top soil and industry workers should be alert to these kinds of conditions. Acid soils are likely to have more acid subsoil and alkaline soils, more alkaline subsoil. These variations should be considered when adding limestone or acidifying agents.

Compacted soils arise from equipment during construction or regular foot traffic and these situations are common to the downtown area, new construction sites, parks, college campus grounds, shopping centers and other people concentrated areas. Compacted soils are typically poorly aerated soils, and without an adequate supply of air roots of most trees grow quite poorly. Applying fertilizer via the drill hole method or injection under high pressure are the preferred methods of application in these situations. Fertilizing trees under conditions of adverse site or environmental conditions is one of the keen observation and common sense.

Location

The location of a tree in the landscape may influence its fertilizer practices. A shade tree in the backyard, typically without stress conditions, usually will require less fertilizer and few applications than a tree planted between the sidewalk and street. The root zone area of the latter is reduced, likelihood of soil compaction, exposure to highway salts, road dust or dirt and air pollutants is greater. Each of these conditions contribute to the need to give greater attention to tree care practices including regular fertilizing to maintain healthy growth.

Determining fertilizer needs

As a guide to proper fertilization, a soil test is recommended prior to fertilizing. If for no other reason, commercial growers test fields prior to planting to make certain that they correct the pH and to incorporate phosphorus if either is needed. It's difficult, if not impossible, to change pH or obtain satisfactory distribution of phosphorus after planting trees. Soil testing may not be necessary for every planting job, however, it should be considered when working in a geographic area where the pH is not known, where site conditions may be unusual or on larger jobs that may involve more than one soil type.

After the planting is completed, testing procedures include both soil and plant analysis. Plant analysis will indicate the precise quantity of 10 or 12 mineral elements in the plants the days of sampling. Instructions for sampling soils and foliage are available from local County Cooperative Extension Service offices. Private laboratories have testing services available but for the most part do not have individuals trained in Landscape Horticulture that can make accurate recommendations for the differences that exist in the different kinds of woody ornamentals produced in most states.

Bark splitting, common with young transplants of Littleleaf Linden, can be markedly reduced by proper fertilization.

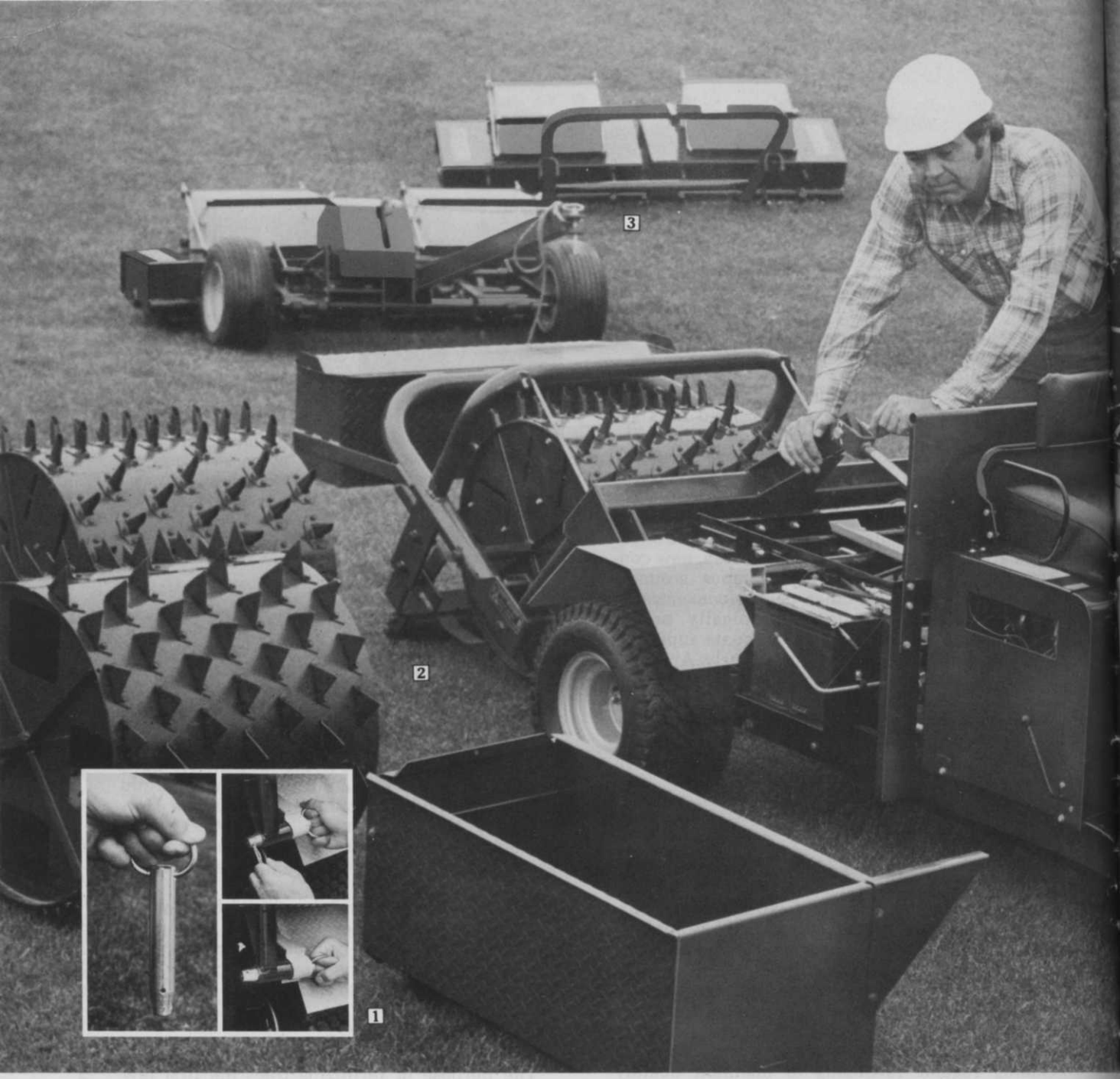
Although plant analysis is utilized far more to diagnose suspected mineral disorders, both plant and soil analysis should be used as an aid to maintaining a proper nutrition program rather than waiting for deficiencies to occur.

Rates

The purpose of fertilizing trees the first few years following transplanting is to increase height, width and caliper. However, once the trees are established and growing well the function of fertilizer treatments are basically to maintain satisfactory growth and health but not necessarily to produce optimum height or caliper, such as the commercial nurserymen is seeking.

Research in Ohio has shown that approximately 3 lbs. of actual nitrogen, the mineral element most responsible for vegetative growth, per 1000 sq. ft. or 6 lbs. every other year is all that is needed to maintain the health of shade trees in most landscape situations. If foliage color, annual growth or general vigor is not normal, increase the rate to 5 or 6 lbs. N/1000 sq. ft./yr. If soil or foliar test results are available, by all means follow these recommendations, otherwise the suggested rate above could be used as a guide.

As a general rule, trees respond well to fertilizers with a 3-1-2 or 3-1-1 ratio such as 24-8-16, 18-6-12, 18-5-9, 15-5-5, 12-4-4 or similar formulations. In



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other words, trees require 3 times as much nitrogen as phosphorus. In many soils the potassium is depleted rather quickly and it should be applied at twice the rate of phosphorus.

The trend in recent years has been to higher and higher analysis in the fertilizer package. Quite often the nitrogen content is 30% or more, and is 4 or 5 times the phosphorus level and these too, although promoted for turf, can be satisfactorily used around trees.

If 3.0 lbs of actual nitrogen is to be used/1000 sq. ft., how much 15-5-5 is needed? To determine the rate of fertilizer, divide the % nitrogen on the fertilizer bag into 3.0. Thus, (3.0 ÷ 0.15 = 20) dividing 3.0, the rate of N, by 01.5 (the % of N on the fertilizer bag with two decimal places as a percent of 100) equals 20 lbs. of 15-5-5 needed to apply 3.0 lbs. of actual N/1000 sq. ft.

Timing fertilizer applications

Greenhouse producers often fertilize their crops with every watering to optimize growth. Commercial nurserymen may fertilize trees 3 or more times/season to obtain the best rate of growth. In the landscape, however, trees are fertilized at much less frequency because optimum growth is not the major objective but, rather maintenance of healthy trees.

Fertilizing once a year is certainly preferable to longer intervals. Although applications twice a year in many situations would be advised. However, many people object to paying for more than an annual fertilization. The best time to fertilize trees is autumn, generally between October and December. The second best time would be early spring prior to growth usually between February and early April. The next choice would be early to mid-summer. If the fertilizer could be split into equal parts and applied in each of 2 or 3 seasons plant response would be superior to one season or alternate year treatment.

Yellowing of the foliage of Eastern White Pine *(Pinus strobus)* and other trees can be prevented by early spring trunk implantation of iron containing capsules. In the pine shown above the capsules were implanted in the main trunk just above the lowest limb.

Methods of fertilizer application

Liquid injection of fertilizer into the soil is rapidly taken in by the roots of trees and is a good method to correct deficiencies of specific mineral elements. Also, the addition of water to dry soil is desirable in the summer.

The major advantage to the drill hole system is opening of heavy compacted soil to provide air. This technique and liquid injection avoid the excess grass growth in turf areas from surface applications.

Surface application is, however, as effective in providing tree response with most species as other methods. It is quick and the least expensive, but should be avoided in quality turf areas.

To correct minor element deficiencies, liquid fertilization to the foliage should be considered, expecially for iron deficiency. This method should not be considered adequate as a means of providing all the necessary mineral elements required by plants.

Tree truck injection and implantation is ideal to apply minor elements such as iron, manganese, zinc, etc. Due to soil pH, moisture relationships and other conditions, this method is often more satisfactory than liquid fertilization of the foliage.

The method selected is dependent on the type of fertilizer being used, the specific purpose of fertilizing, soil conditions, location of the tree, the presence of quality turf, among others. Needless to say, equipment should always be properly calibrated and in good working order.

Summary

To answer the question of how much fertilizer a shade tree needs, the applicator must consider several factors. We must know species differences to more precisely define specific requirements. Soils are variable from the standpoint of textures, pH, and cation exchange capacity. Recognizing these differences will help us to fertilize more accurately for the performance of the trees. The location of trees in the landscape often dictate differences in fertilizer practices particularly if unusual stress factors are involved from humans, autos, pollution, etc. Fertilizer needs of trees can be identified with soil or plant analysis. Where recommendations are not available, based on laboratory tests, fertilize trees at the rate of 3 lbs. actual N/1000 sq. ft./yr. Use a 3-1-2 or 3-1-1 ratio to provide the necessary phosphorus and potassium. Apply the fertilizer annually or more often, if possible, depending on tree growth. Late autumn is a good season to apply fertilizer with early spring a solid second choice. Several methods can be selected to apply fertilizer and the choice depends on several factors.

Fertilizing shade trees to maintain satisfactory health and vigor requires a number of judgments based on keen observations by experienced people.

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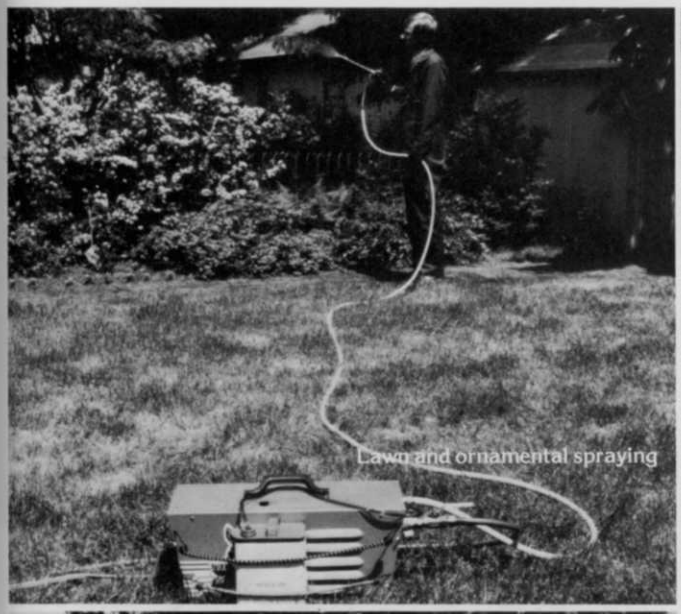
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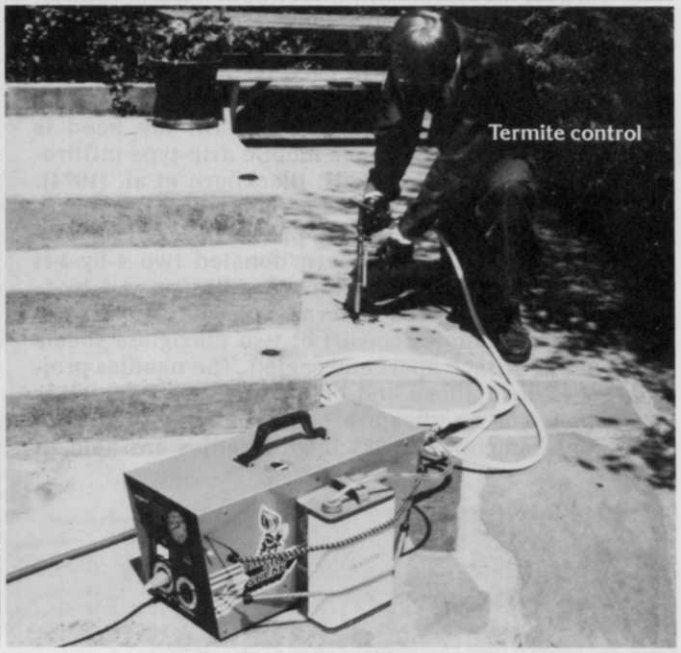
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TOWER SIMULATES RAINFALL PROVIDES FACTS ABOUT MULCHES

By Burgess L. Kay, Specialist in Wildland Planting, University of California

How effective are the many erosion-control products being developed or offered for sale? Do these glues and mulches protect the soil surface, holding seed and moisture in place as the salesmen claim? Are they compatible with commercial fertilizers? These questions prompted the construction of a raintower for study of the effect of raindrops on soil surfaces given various treatments.

Selected for tests are problem soils from highway cuts as determined by the California Department of Transportation. These soils are placed in greenhouse flats of 11 x 19 inches, and mulch, glue, seed, etc., are sprayed over the surface with a hydromulcher. Tests have been run on these surfaces with the flats tilted at 1:1 to 2:1 (horizontal to vertical measurement) under both natural rainfall and rainbird-type sprinklers. The need soon became apparent for a more uniform artificial rainfall that would expose each tested surface to exactly the same size and number of "raindrops."

The raintower developed to fill the need is adapted in design from a mobile drip-type infiltrometer reported by W. H. Blackburn et al. (1974). They used the portable model to measure infiltration rates and sediment production on Nevada rangelands. Dr. Blackburn donated two 4-by-4-ft modules containing hollow needles on a 1-by-1-inch grid. The needles form drops of 2 mm diameter. The modules consist of two plexiglass sheets spaced ½ inch apart and sealed. The needles project ¼ inch above and below the lower plexiglass sheet. The needles are ¾ inch long with an outside diameter of 0.025 inch. Needles are held in

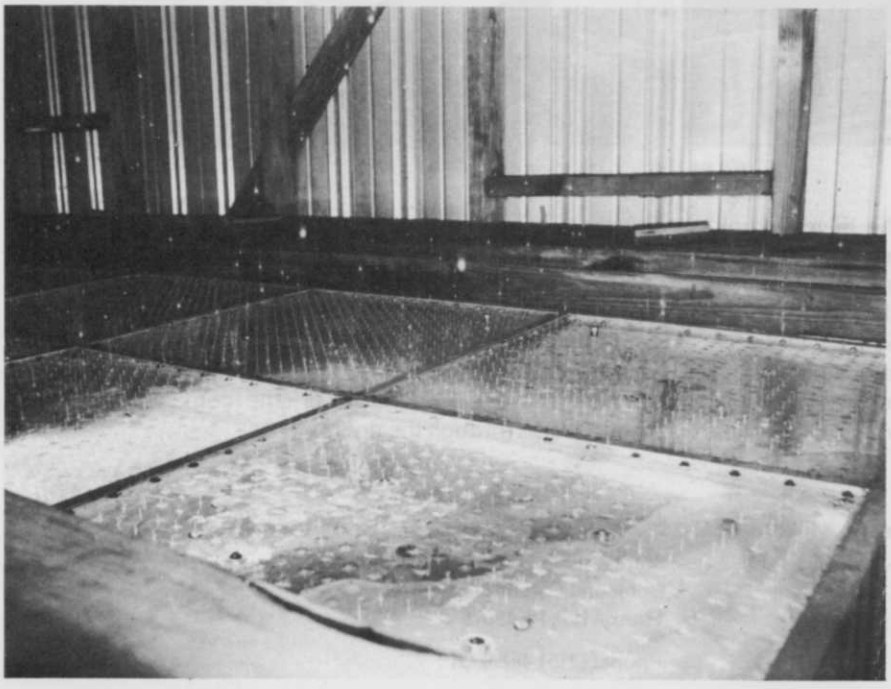
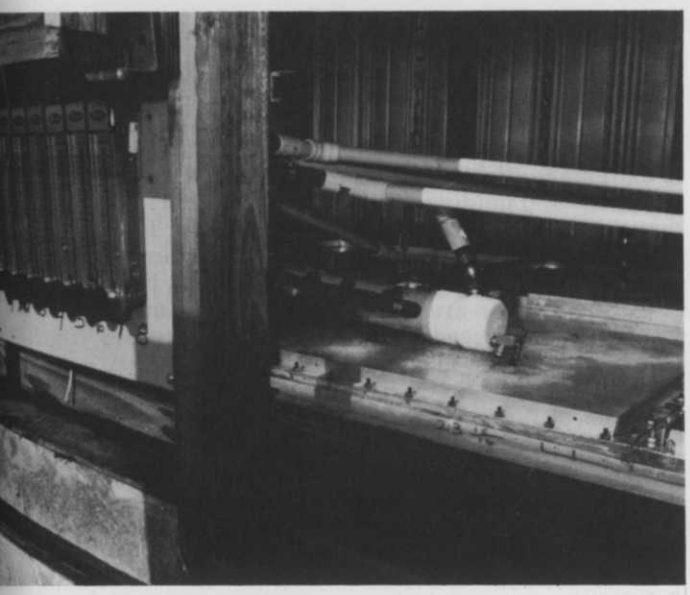


Figure 1 (above): Raintower produces artificial rain which strikes the surface of erosion-control treatments on inclined surfaces. **Figure 2** (left): Water drops 3mm in diameter are formed by water dropping from holow steel tubes mounted in a plastic chamber. **Figure 3** (above right): Rainfall rate is controlled by flowmeters on left, which control flow to modules on the right.



place with epoxy cement. Water pressure is supplied from a reservoir mounted 4 ft. above the flow regulators. Rainfall intensities are possible of 0.2 inch to 3.3 inches per hour controlled by a Manostat (Cat. No. 36-541-30) flowmeter.

The above plates were mounted in an enclosed tower (Fig. 1) which allows the drops to fall 14 ft. 10 in. to the surfaces to be observed. Twelve of these surfaces (greenhouse flats) are mounted in a cart which can be adjusted for slope angle.

Initial testing was with the above plates making 2 mm drops at an intensity of 2 inches per hour. The results were uniform but not as erosive as natural rainfall. An additional 4 inches per hour was applied by a mist system. These very small drops had no effect on erosion, even though they tripled the amount of water applied. Erosion was initiated by the energy of the large raindrops striking the soil, with the smaller drops merely helping to flush away the soil particles.

Reports of rainfall intensities and drop sizes (Laws and Parsons, 1943) indicate that natural rainfall commonly has rates that are briefly much higher than 2 inches per hour and with drop sizes larger than 2 mm. Because maximum effect seems desirable with the short slopes being tested (19 inches), we decided to make some changes.

New modules (Fig. 2) constructed at 2-by-2-ft reduced the center sag of the 4-by-4-ft modules and allowed for more precise metering. Eight flowmeters (Fig. 3) (Dwyer RMB-83) are fed from a common manifold located 4 ft. below a 55-gallon drum which serves as a common reservoir. A float valve

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maintains the drum at capacity. Needle size was increased to 0.028 inch O.D. (Drop size is determined by the outside diameter and surface characteristics of the needle, since drops are formed via the sides and lower surface of the needle rather than the inside diameter.) Drop size is now about 3 mm, compared with the 2mm used earlier, and weigh over 3 times as much as before. Falling 14 ft. 10 in., they reach a velocity of 22.5 ft./sec., or 85% of the terminal velocity achieved by raindrops in an unlimited fall (Laws, 1941).

We have found that using the above modules at a rate of 6 inches of "rain" per hour is a practical compromise between the maxima found in nature and the amount of time available to make observations. The extremely short slope makes it impossible to compare the results with what might happen with similar amounts of rainfall on a field slope.

The value of the raintower is that twelve different soil surface treatments can be compared in a single test under identical testing conditions. We can determine whether a treatment is better than no treatment, or better than a standard treatment such as wood hydromulch fiber at 1,500 lb/acre. It is fascinating to watch the raindrops strike the surface and see how destructive this energy can be if not absorbed by a mulch.

What have we learned about the erosion-control products? Some of the highlights are that straw is extremely effective in absorbing the energy of raindrops and holding soil. Hydromulch fibers, although not nearly as effective as straw, will, if applied at a high enough rate, provide considerable protection. Virgin wood fibers or fibers from corrugated paper are superior to mulches made from newsprint, seed screenings, etc. An organic gum or glue added to a virgin wood fiber has very little effect.

Some of the plastic or synthetic rubber products are the most effective in cementing soil particles together. Optimum dilution rates of these products were determined. Wood fiber was shown to increase the effectiveness of these products. Some glues are not compatible with fertilizer.

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GREENBUG DAMAGE FOUND ON KENTUCKY BLUEGRASS

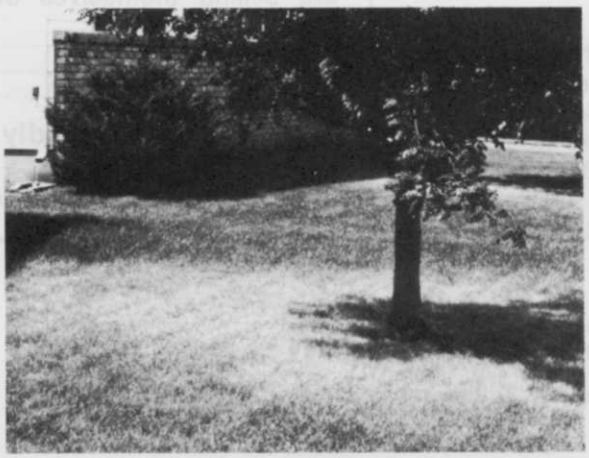
By J. R. Street, R. Randell, and G. Clayton

J. R. Street is Assistant Professor of Turfgrass, and R. Randell is Associate Professor of Agricultural Entomology, University of Illinois, Urbana, Illinois, and G. Clayton is Turfgrass Specialist, Professional Turf Specialties, Bloomington, Illinois.

The greenbug, *Shizaphis graminum*, is a widely distributed aphid in North and South America, Europe, Africa, and Asia. It is a well-known and serious pest of grain crops including oats, wheat, and barley, particularly in the central states from Texas to North Dakota and Minnesota. It also feeds on other small grains, corn, rice, sorghum, and forage grasses. Heavy infestations of greenbugs have caused total destruction of both winter and spring grain crops.

In 1970 and 1971, Dr. Roscoe Randell, of University of Illinois reported noticeable damage to Kentucky bluegrass by the greenbug in central and eastern Illinois during the late summer months. This was the first time that the aphid was observed as an epidemic on turf. Prior to this, aphids were considered as incipient turf pests that contribute slightly to the total stress on turfgrass, but not sufficiently to cause economic damage and justify separate control. Greenbugs and their damage have been observed occasionally on turfgrass areas from 1971 through 1977 in Illinois.

Lawns damaged — In June 1978, large circular to slightly irregular patches of dead grass were observed under trees, as well as in open, sunny areas on lawns and other turfgrass areas. These patches usually ranged in diameter from 3 to 15 feet or more. Initial observation suggested dormant or drought-stressed grass, especially since much of the damage occurred underneath the tree canopy. The outside perimeter of brown, dead turf was surrounded by a narrow band of yellow to reddish-orange (rusty) grass. Immediately outside the narrow band the grass was green. Upon closer observation, individual plants taken from the chlorotic turf were found to be hosting large numbers (100 or more) of aphids. Aphid feeding continued during the July and August months.



A common site of greenbug damage is turf underneath a host tree.

Greenbug description — The adult greenbug is approximately 2-3 mm long, soft-bodied, somewhat pear-shaped, and pale yellow to bright green with a dark green stripe running down the back. It has one pair of antennae and 3 pairs of legs, characteristic of members of the order Insecta. The predominant form of the greenbug is winged and wingless females and their young. The young are produced parthenogenetically (without fertilization) and viviparously (bear living young). Young develop via simple metamorphosis with the young passing through several nymphal instars in about a week. As a rule, existing parthenogenetic biotypes live about one month and produce 50 to 100 young. As many as 20 generations of the viviparous females may develop during one season.

The specific biotype and migration habits of the greenbug feeding on turfgrass have not been clarified. Outbreaks of other greenbug biotypes in the north are considered to arise from the migration of winged aphids originating in southern grain fields. The aphids leave wintering places in the south during March and April with strong southerly winds. These migrants feed on grain crops in the central states. When grain in these areas mature in May, aphids are again produced in large numbers and carried by southerly winds to more northerly states. Present greenbug biotypes are not believed to survive in any of their stages in the north due to the extreme cold winter temperatures. Future research needs to be conducted to define the specific biotype feeding on turfgrass and its overwintering habits.

Feeding and damage — Like other aphids, the greenbug has specialized mouth parts called stylets that are well adapted for sucking juices from the plant. There is also a duct for the ejection of salivary secretions. The salivary fluids contain enzymes that break down the cell and their contents and kill the living tissue. Turfgrass blades resulting from greenbug feeding first show yellow spots with necrotic centers, then turn a rusty color, and eventually turn brown. The greenbug appears to be primarily a feeder on Kentucky bluegrass, causing no damage to fine fescues and other turfgrasses in adjacent areas.

Control — Although most commonly used turfgrass insecticides are effective for greenbug control, malathion is the only insecticide presently carrying a label for use on grasses. The recommended rate of malathion, 57% liquid concentrate, is one tablespoon in 3 gallons of water per 1000 square feet applied to the area infested by the aphid. Under most situations, it is felt that spot treatment would be sufficient to keep the problem to a minimum. **WTT**

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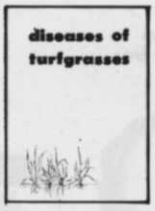

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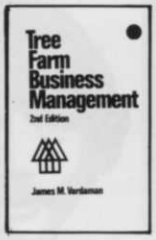

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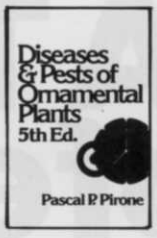

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WT&T
PROFILE

Public Park Management

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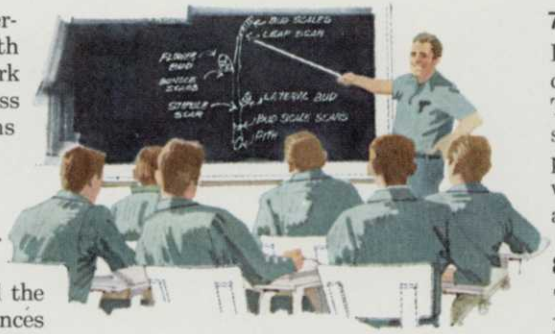

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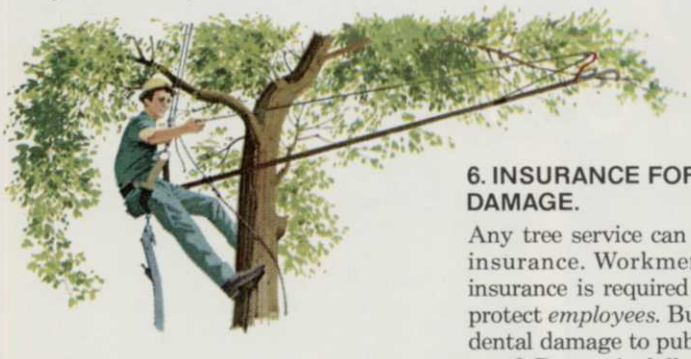
2. SURVEYS FOR PREVENTIVE MAINTENANCE.

We'll make surveys of deadwood, hazardous trees, proper clearance for streets, lights, pedestrian paths, and all other pruning needs. And, we'll provide cost estimates to help you plan your grounds maintenance budget. This can help you schedule catch-up work during off-season months, reduce the need for overtime, avoid emergency work, and provide for safety and security.



3. SKILLFUL PRUNING, CABLING AND BRACING.

Besides pruning deadwood and hazardous limbs to ensure public safety, Davey can cable and brace trees vulnerable to damage from high winds, snow or ice storms. We'll handle the clean-up or you can use your own crews.

4. ENVIRONMENTAL SERVICES.

This new service offers you complete horticultural appraisal, consultation, environmental impact studies and street tree plans and inventories.

5. PATENTED TREE FOOD.

Davey's ARBOR-GREEN® tree fertilizer is available for direct purchase or it can be applied by Davey crews. This fine, dry powder remains in suspension when agitated in water and can be applied by economical hydraulic soil injection. Since the nitrogen source is 100% organic, ARBOR-GREEN combines all the advantages of dry, organic fertilization with the economical distribution of liquid injection.

6. INSURANCE FOR PROPERTY DAMAGE.

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Davey (and *only* Davey) backs its tree care personnel with services of the Davey Tree Horticultural Center. The center is staffed with scientists trained in plant pathology, entomology and agronomy, with advanced degrees in horticulture and plant physiology.

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The Davey Tree Nursery has more than 150 varieties of shade and ornamental trees. From thousands of smaller trees all the way up to ten inches in trunk diameter.

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CITIZENS PAY $16 EACH FOR USE OF PUBLIC PARKS

Approximately 35,000 parks serve 216.5 million U.S. citizens. They do it at a cost of $3.5 billion per year (1975 U.S. Bureau of Census), or roughly $16 per person per year. Parks have to be the best value in the realm of recreation at this cost.

Weeds Trees & Turf surveyed 1,000 park managers in August and received 210 responses. The names were selected at random from the approximately 3,500 park managers receiving the magazine.

The National Recreation and Park Association (NRPA) counts 291 Federal parks, 3,804 state parks, and 31,235 municipal, county, and city parks. One park director may supervise a number of parks, in fact each park may not have its own full-time maintenance person. In 1970, the NRPA reported that less than 21,000 professionals worked full-time for the 31,235 municipal, county and city parks. Many local parks are maintained as a part of the whole county or municipal program.

Out of NRPA's 18,000 members, 5,000 are known to be managers of parks. If you assume that each state and Federal park has one manager, a figure of 4,095 managers is obtained. Making another assumption that cities with more than 10,000 residents and all counties have one person directly or indirectly in charge of parks, there are another 4,260 park managers. Consequently, a 'bottom line figure' of 8,355 park managers in the U.S. is obtained.

The 210 persons answering the survey had 78 different titles, from park division chief to landscape foreman. It is as if governments try to defy anyone to label all or part of them with one title.

The respondents manage parks averaging 1,064 acres (median 336) with an average budget of $268,000 (median $260,000). Sixty-five percent of the respondents indicated their budgets are too low to do the job desired by them. An increase of 35 percent was the average needed to meet their level of satisfaction. One park manager said he needed twice as much money to do his job properly.

One way park managers combat low budgets is by doing much of the contract work themselves, such as drainage and irrigation installation, sod installation, pest control, and tree care.

Jobs performed by the greatest number of park managers and their crews are seeding, fertilization, mowing, planting and care of ornamentals, and tree trimming. The types of work hired out most are tree trimming, irrigation installation, and drainage installation, although less than half the managers contracted for these services.

Jobs not done either by outside contractors or park workers are tree feeding (20 percent), sod installation (28 percent), aquatic weed control (43 percent), sprinkler system installation (35 percent), and drainage system installation (26 percent).

Park managers fertilize roughly 40 percent of their turf area and irrigate an average of 30 percent (median 5 percent). The irrigation figures suggest that small numbers irrigate large portions of parks and large numbers irrigate small portions or none at all.

Eighty percent of the respondents said their park has baseball fields, 65 percent have soccer and football fields, and 57 percent have lakes or pools.

Managers reported an average of 12 persons on staff performing turf and tree care. This figure is high when compared to NRPA data for state and local parks which counts 133,000 personnel at 35,000 parks (about four persons per park).

The two largest expenditures for

Annual expenditures by park managers.

Type	Average	Percent Responding	Projected to 8,355
Equipment	$15,291	92	$117.5 million
Sod	$ 3,830	63	$ 20.2 million
Seed	$ 1,150	87	$ 8.4 million
Ornamentals	$ 7,870	90	$ 59.2 million
Chemicals	$ 3,982	89	$ 29.6 million
Total			$234.9 million

Work performed by staff or contracted out.

Job	Done By Staff	Done By Outside Contractor	Not Done
Seeding	95%	5%	3%
Sod Installation	62%	13%	28%
Turf Fertilization	91%	4%	6%
Turf Pest Control	79%	4%	6%
Mowing of Turf	98%	2%	1%
Planting of Ornamentals	92%	16%	3%
Caring for Ornamentals	94%	3%	2%
Tree Feeding	76%	3%	20%
Tree Pest Control	79%	14%	13%
Tree Trimming	88%	21%	1%
Aquatic Weed Control	45%	6%	43%
Care of Athletic Fields	77%	14%	15%
Sprinkler System Installation	39%	37%	35%
Drainage System Installation	52%	26%	26%

*Respondents checked more than one column.

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75TH ANNIVERSARY

Public Parks

parks are equipment and ornamentals. Managers spend an average of $15,000 for equipment and $8,000 for ornamentals. They also spend an average per year of $4,000 for chemicals, $3,800 for sod, and $1,150 for seed. Most purchasing is from local dealers (67-78 percent). Most purchasing for chemicals takes place in February through April, with very little chemical purchased in November or December. Equipment purchasing is done primarily in January, February, and July. Equipment purchases are not as heavily weighted to months as with chemicals. May, June and December are the slow months for chemical purchasing.

Averages projected to 8,355 park managers give annual expenditures of $235 million for equipment, chemicals and supplies. This is a 'bottom line' estimate of expenditures based upon a very conservative estimate of the number of park managers. It also doesn't take into consideration extremely large purchases by Federal and state parks, especially those with golf courses. **WTT**

Equipment operated by park staff.

Equipment	Percentage Responding	Mean Response
Backhoes	46%	1.4
Chain Saws	91%	7.0
Flexible Line Trimmer	45%	3.3
Front End Loader	75%	1.8
Flail Mowers	55%	2.2
Rotary Mowers	89%	7.1
Reel Mower	53%	4.0
Sickle Bar	39%	1.9
Small Trim Mowers	67%	8.1
Compressed Air Sprayer	32%	2.4
Complete Sprayer with Pump and Tank	69%	2.0
Small Push-Type Spreader	67%	3.2
Large, Truck Mounted Spreader	42%	1.5
Sweepers	40%	2.0
Less than 60 H.P. Tractors	77%	4.7
More than 60 H.P. Tractors	38%	2.9
Utility Vehicles	70%	6.7

Months equipment is purchased.

	Chemicals*	Equipment*
January	5%	13%
February	12%	12%
March	16%	7%
April	16%	8%
May	9%	5%
June	8%	4%
July	6%	10%
August	8%	8%
September	9%	9%
October	6%	8%
November	3%	7%
December	2%	5%

* Percentages are percentages of all responses which occurred in the given month.

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Each case includes
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Your name_____

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Make check payable to Ross Daniels, Inc.

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BROOKLYN PARK: GOLD MEDAL WINNER

"It used to be that a park got what was left over from a city's budget. Today, that is not always true. People are demanding more and better athletic complexes all the time."

With that statement, Lloyd Olsen, park superintendent at Brooklyn Park, Minnesota, expresses the commitment that the city administration has made to supply residents with a quality park system.

Olsen is starting his twelfth year as superintendent for Brooklyn Park. When he first came to the city in 1967, it had 100 acres of park land, two buildings, and hardly any equipment. Now, the city has 881 acres of parks and enough equipment to complete a park once the rough grading is done.

Brooklyn Park is just northwest of Minneapolis. One thing the city does not do over the 27 square miles it occupies, is sprawl. Brooklyn Park is being copied around the United States for its planned community development. The park system is a prime example.

The city has 881 acres of parks for its 40,000 residents. This meets minimum standards set by the National Recreation and Parks Association. Brooklyn Park will reach a population of 120,000 according to Director of Parks and Recreation, Dennis Palm. By that time, he plans to have 2,000 acres of park developed for the residents.

Brooklyn Park passed a $600,000 bond issue in 1967. With part of that backing them, they applied for a federal grant, received nearly $300,000, and bought a par three golf course and quite a few other pieces of park land around the city.

In 1972, residents passed another bond issue for $200,000. Olsen states, "Through those two bond issues, we've been able to apply for various federal and state grants and we've managedto turn that money into more than two million dollars worth of acquisition and development. "We've made the bond issue work for us." The city also has a clause requiring a developer to turn 10% of the land he is developing, or an equal amount of money, over to the city parks department.

Brooklyn Park has twenty-eight developed parks. They range in size from one acre to more than a hundred. "We refer to anything over 25 acres as a community park," says Olsen. "Anything under that is a neighborhood park.

"Neighborhood parks will normally have a warming house, playground equipment, hockey rink, skating rink and one or two ball fields, depending upon its size. What we try to do is put a park within walking distance of every child in the developed areas."

Palm's and Olsen's efforts have not gone unnoticed. In 1967, the Parks and Recreation Department received the National Gold Medal Award from the National Sports Foundation, the highest such award given. They have put the finishing touches on their new acquisitions and are applying for the award again this year.

The parks are popular with the residents. This summer, they were the scene of over 4000 softball games. And, the park staff drags every field before every game!

Olsen has a full time staff of eight. This summer he built up to 33 people. He is planning to keep 12 through this winter. "We get a lot of college students," he says. "I've been fortunate in that I get some who come back throughout college. They know the ropes. That's one thing wrong with part-time people. You get somebody green and by the time you get him trained, he's ready to go back to school."

All park construction and maintenance, except heavy grading is performed by the maintenance staff. Equipment includes 7 tractors, 3 rotary mowers, 2 self-propelled mowers, 14 trucks and 4 pick-up trucks, plus all the other equipment it takes to maintain quality turf and trees.

River Park, for example, has twenty-six acres along the Mississippi River and its major use is as a picnic facility in the summer. It has two softball fields and a skating rink for winter. All of the parks have playground equipment. River Park is known to the kids as "Rocket Park" because of a very large slide that has the steps in the shape of a rocket.

Another park that Olsen says is maintained strictly for picnics has playground equipment spread throughout the area to distribute the wear. There are also some ponds

Department found an artesian well that supplies steady water.

If the price
what's the bi

Cushman makes a fine turf vehicle. But does it equal E-Z-GO? It's often difficult for you yourself to make an honest comparison. So we've done it for you. We took comparable top-of-the-lin models, E-Z-GO's GT-7 and the Cushman Turf Truckster. Head to head, here's what we found.

Power Source: 18 horsepower OMC engine, tightly compartmentalized. Ground speed 0 to 22 mph.

Braking: Hydraulic internal expanding.
Payload: 1000 pounds.

Suspension System: Torsion bars, leaf springs, front and rear shocks.

Dump Construction: Single wall, no undercoating.

Headlights: Single.
Seating: Single seat for one passenger with back rest and hip restraint.

Price: Virtually the same.

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Power Source: A rugged, reliable 18 horsepower Onan engine with the power to carry a full payload up to 24 mph. Substantially larger engine compartment for easier maintenance.
Braking: Improved hydraulic internal expanding.
Payload: 1500 pounds. A massive 50% greater carrying capacity than Cushman. More cubic space for greater material volume.
Suspension System: Heavy duty torsion bars, leaf springs, front and rear shock absorbers, designed to support the bigger payload.
Dump Construction: Dual wall, double thick for heavier loads, longer life. Undercoating for even greater resistance to corrosion.
Headlights: Dual lights for greater night vision.
Seating: Dual seats for two passengers with individual back rests and hip restraints, constructed for larger men, greater comfort.
Price: Virtually the same.
Summary: E-Z-GO carries a greater payload, is easier to maintain, is larger, more durably built, and safer with a wider wheel base. E-Z-GO uses top quality components from companies, such as Bendix, Borg Warner, Dana, Onan, and Rockwell International.
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that they dredged for children to swim in.

The parks are well landscaped as evidenced by the many varieties of trees. The Parks Department has three tree nurseries located throughout the city totaling about 55 acres. Species in the nursery include ash, maple, hackberry, linden, and some oaks. Olsen estimated that, two years ago, he had $150,000 worth of young trees in the nurseries. He doesn't transplant the trees until they reach about a 4-inch diameter. Otherwise, kids damage them when they play around them.

The Parks Department has saved money in developing the parks by using the city engineering department. "When we talked to consulting engineers for planning the parks system and found out how much they wanted to do it, we decided to see if maybe we could just as well use our own engineering department," Olsen says. "It's worked out very well. We've managed to stretch our money a long way by doing our own planning end of it, having the engineering staff draw the grade plans and so forth."

This piece of playground equipment has changed the name of River Park. The slide in "Rocket Park" is popular among the younger residents of Brooklyn Park.

The Parks Department has purchased this farm and will return it to its "turn-of-the-century" state.

The Parks Department has qualified management. Director Palm graduated from the University of Minnesota in 1963 with a Master's Degree in Parks and Recreation Administration. He accepted the position in Brooklyn Park in 1965. His position involves development of policies, programs, and facilities to meet the city's needs.

Assistant Director Steve Roe graduated from the University of Minnesota also, in 1973, with a Bachelor's degree in Parks and Recreation Administration. His responsibilities include planning, evaluating, and overseeing all phases of the recreation programs.

Recreation programs include soccer. The season is just winding up. When hockey comes into season, the department will maintain 42 skating rinks.

Winter kill is a major problem when you get that far north. "I try to take my grass into the winter just as healthy as I can," stresses Olsen. He fertilizes the park turf in spring and fall. "We take soil samples and send them to the University of Minnesota for analysis. Then we apply what they recommend."

"I also work on the basis that if I keep my grass healthy and cut it right, I won't get a big disease problem." The Parks Department does not follow a preventative disease program, but it does spray if disease becomes a problem. Trees are watched closely for any symptoms. An outbreak of Dutch Elm disease is anticipated with a sanitation program.

The golf course is irrigated. The rest of the park area receives enough rainfall. This year rainfall has been especially abundant.

Olsen is treasurer of the Minnesota Park Supervisors Association. The association has been active in the state for the past one and one-half years. "It has been our hope through this organization, to professionalize our work," Olsen states. He feels that the association has filled a void, allowing park supervisors now to share their knowledge in solving common problems.

Utilizing available resources to the fullest in a program of planned development has worked for the Brooklyn Park Recreation and Parks Department. *Ron Morris*

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MEMORIAL PARK: FARMLAND TO FUNLAND

Fran Leusner has the job of providing recreational and other services for the 20,000 residents of Cinnaminson, New Jersey, an eastern suburb of Philadelphia. As superintendent of public works, Leusner wanted to establish a convenient and useful park for the community of single family homes. Forty-four acres of farmland in the 7½ sq. mi. township were purchased for conversion into a park facility.

"We had to excavate the entire area and put in roads, parking lots, baseball fields, football/soccer fields, an irrigation system, water fountains, a bike path, a jogging path, tennis and basketball courts, and all the turf and trees required to make the park attractive," says Leusner.

Today, Memorial Park in Cinnaminson has handsome gardens and the pond may soon provide fishing and canoeing to residents. Since much of the work was done by city work crews, the entire project cost only about $500,000 against an estimated $950,000 had the work been contracted out.

Maintenance of the park is also integrated into the city programs, but Leusner estimates that he has five or six men working at the park every day. He has a park foreman who supervises the maintenance efforts at Memorial.

When the park was first prepared for planting, Leusner applied a mixture of 50 percent municipal sludge with an equal amount of composted leaf mulch and spread it over the entire area. He had made arrangements with the local waste treatment facility to acquire all the wastes for use in this manner. The state has since halted his efforts but steps are being taken to work the matter out.

Leusner now acquires manure from the riding stables nearby and mixes it with the leaves for winter application throughout the park.

Then, in April, he applies a 10-6-4, 50 percent organic fertilizer to the park grounds. They are given a light shot in summer, and fertilized again in the fall. A preemergence crabgrass preventer is applied every spring. The combination soccer/football fields and baseball fields receive selective herbicides as needed. Leusner plans to institute a complete program of O.M. Scott & Sons products next year.

Most of the turf in the park is K-31 fescue. The baseball infield was sod-

Above: Costs were cut nearly in half by having the work performed within the city's work force. Here Cinnaminson Public Works men take grade shots. **Right:** An asphalt bike path and jogging path follow side by side. **Below:** The baseball field, ready for its first game.

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Extensive landscaping was done around a sandbox for small children.

ded with Merion Kentucky bluegrass. The infield is reseeded every year. The outfield is seeded on an as needed basis. Leusner reseeds the combination football/soccer fields every year, also.

Trees in the park are mulched twice a year and watered regularly. A quick coupler irrigation system provides a ready source of water.

Leusner recently switched to S&D Products Eeesy Gro Pakets to fertilize the trees. The fertilizer is slow release, applied 8-10 inches around the young trees and a little deeper around the larger trees. The trees shouldn't need additional applications for three years.

Trees in the park include Bradford pear, crab, cherry, Norway and Australian spruce, and white pine. Leusner maintains a nursery and rents a tree spade for transplanting.

When the park was first constructed, most of the trees were brought in bare root, even though plans called for balled and burlapped. Less than one-fourth were. The actual cost was $8000 against an original estimate of $55,000.

The trees are sprayed with insecticide routinely. Japanese beetle and scale insects are the major concerns in Memorial Park.

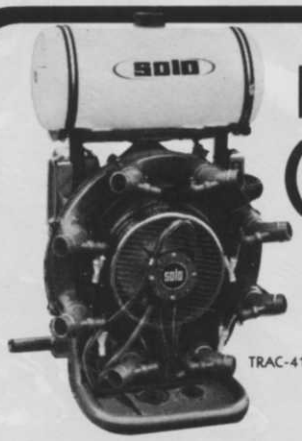
The county sprays the pond for mosquitoes, but Leusner tests once a week for larvae to make sure it doesn't get out of hand. There are fish in the pond now and that does help mosquito control somewhat.

Equipment for maintaining the park is integrated with that of the city. Leusner does have two large diesel Ford tractors and a Farmall equipped with a mower. Mowing units include a Mott and a 72-inch rotary. He also has a gang unit but it is seldom used except as a backup.

Budget figures are hard to break out in a situation where park management is integrated into the city budget. Leusner estimates that he gets about $5000 for fertilizer and seed.

He puts a bid out in March and then purchases as needed. He also purchases and applies lime according to soil tests, which are performed every year.

Community support for the park is tremendous, Leusner says. "Its a masterpiece as far as the people are concerned. They love it." **WTT**



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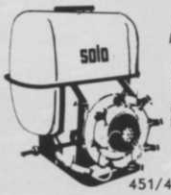

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COSTS AND RETURNS OF MARYLAND SOD PRODUCTION

By J. Thomas Gilbert, Jr. and Billy V. Lessley[2]

This is the final in a series of three articles dealing with the structure and costs and returns for sod production and marketing in Maryland. The first article introduced the Maryland sod industry's characteristics for the 1976 crop year and the second provided costs and returns per acre for sod produced and marketed on an unharvested basis. The purpose of this article is to describe, develop and present costs and returns for the various vertically integrated options observed for the Maryland turfgrass industry in 1976. These options include different harvest techniques employed to lift the sod and different transportation methods used to deliver the harvested product. Production costs for this analysis were reported in the second article and are shown in Table 1. All data are based on a research project conducted through the Maryland Agricultural Experiment Station.[3]

Thirty-four of the 56 producers who cooperated in the study performed integrated services such as cutting, cutting and loading, delivery, and/or installing Maryland turfgrass. Of these 34, 23 reported delivering and/or installing turfgrass. In general, those individuals who harvested also delivered and installed the turfgrass. These individuals were producers or were a part of a landscape company who had contracted the acreage. A few producers cut only, or cut and loaded sod for other contractors. Generally, landscapers and sod installation companies possessed their own equipment and manpower to harvest the turfgrass and did not desire to pay a premium price for the sod if the producer wished to harvest it himself.

Totally vertical integrated operations were the exception rather than the general rule for several reasons. First, since sod is a highly perishable product once it is lifted (cut) and loaded, har-

[1] Scientific Article Number A2508, Contribution Number 5539 of the Maryland Agricultural Experiment Station, Department of Agricultural and Resource Economics.

[2] Research Assistant and Professor, Department of Agricultural and Resource Economics, University of Maryland.

[3] An Experiment Station publication giving more detailed information will be available for distribution in late fall or early winter.

[4] Harvest equipment cost based on an average harvest of 70.6, 15.8 and 42.5 acres for the palletizer, hand-directed and tractor-powered methods of harvest, respectively.

Table 1. Average Total Costs of Production for Various Sizes of Turfgrass Farms, Maryland, 1976

Item	Farm Size				
	Less Than 100 Acres	100-150 Acres	151-300 Acres	Greater Than 300 Acres	All Growers
	— Dollars Per Acre, Two-Year Production Period —				
Fixed Costs					
Machinery and Equipment					
Depreciation	68.12	48.10	37.64	35.55	41.29
Repairs	34.06	24.05	18.82	17.78	20.65
Insurance	4.08	2.89	2.26	2.13	2.48
Permanent Structures					
Depreciation	19.26	14.56	10.78	10.18	14.70
Repairs	3.86	2.92	2.16	2.04	2.94
Insurance	3.86	2.92	2.16	2.04	2.94
Supervisory Services	7.21	6.70	15.14	26.05	13.65
Real Estate Tax	9.00	9.28	9.24	9.38	9.28
Interest on Fixed Capital	52.50	38.26	30.44	29.78	35.52
Land Rental Rate	70.00	70.00	70.00	70.00	70.00
Average Fixed Cost	271.95	219.68	198.64	204.93	213.45
Variable Costs					
Seed	78.40	60.80	69.00	84.32	76.13
Fertilizer	32.96	33.40	29.12	37.06	33.54
Top-dressing	84.12	79.26	72.52	77.64	80.80
Herbicides	11.07	11.91	15.25	20.85	14.31
Lime	17.59	13.25	19.25	14.83	16.59
Fuel and Oil	32.27	30.36	26.77	31.55	31.11
Production Labor	63.65	60.39	45.44	59.58	59.61
Interest on Variable Capital	28.11	25.47	24.40	28.65	27.43
Average Variable Cost	348.17	314.84	301.75	354.48	339.52
Average Total Cost	620.12	534.52	500.39	559.41	552.97

vesters must be guaranteed a final market prior to harvest. This is especially difficult for producers who do not possess the resources or desire to search out and transact key sales or who do not choose to be involved with managing a harvest-delivery-installation operation.

A second factor contributing to limited vertical integration in the industry is the constraint imposed by the capital outlay for equipment necessary to harvest, deliver and install turfgrass. The high capital costs of this specialized equipment, coupled with the high annual costs of operation, are too expensive to be considered economically feasible by many Maryland turfgrass producers.

There were three methods of harvest observed on Maryland turfgrass farms. These varied widely in the degree of mechanization and, subsequently, labor use. The first method, used mostly by small-scale harvesters, involved using a hand-directed machine which cut the sod in segments 15 inches wide and three to four feet long. The sod was then rolled into balls and hand loaded onto trucks. The second method involved using a tractor-powered sod cutter which lifted the sod. The sod was then rolled and hand loaded onto trucks. The final method, observed on turfgrass farms where large acreages were harvested, was characterized by use of a palletizer mounted and secured on a tractor. The palletizer lifted the sod and transferred it up a conveyor belt while rolling it into a ball. At the end of the conveyor, and stationed on the back of the tractor, one or two men received the rolled ball and loaded it on a pallet. The pallet was dropped at the rear of the tractor when it became full. Extra pallets were carried on the side of the palletizer so very little time was spent waiting for extra pallets. Full pallets were then loaded on waiting trucks by a forklift.

Costs and returns for harvested turfgrass are presented on both an acre and a square yard basis. Cost and return figures developed on a per acre basis were converted to a square yard figure by using a harvest rate of 95 percent, or 4,600 square yards per acre.

Twenty-three harvesters supplied detailed information concerning the varied methods of harvesting turfgrass. Labor costs for the three methods are reported in Table 2. These costs include labor for lifting, rolling and loading turfgrass. As shown in Table 2, total labor hours and total labor cost decreased as the degree of mechanization increased.

Total labor cost for the hand-directed, hand rolled method was $288.11 per acre, 16 percent greater than the labor cost of $247.32 for the tractor-powered, hand-rolled method. Use of the palletized system cut labor cost by 38 and 46 percent, respectively, when compared to the tractor-powered and the hand-directed, hand-rolled systems of harvesting turfgrass (Table 2). However, the advantages of labor savings and decreased harvest time associated with the palletizer method were partially offset by increased equipment investment (palletizer, replacement pallets, tractor, forklift) and associated annual fixed and variable costs for the more sophisticated system of harvesting and loading turfgrass.

Table 2. Average Labor Requirements, Wage Rate and Labor Cost for Harvesting Turfgrass by Various Methods, Maryland, 1976

	Method of Harvest		
	Hand-Directed Hand Rolled	Tractor-Powered Hand Rolled	Palletizer Palletized Handling
Total Labor	$288.11 /acre	$247.32 /acre	$154.47 /acre
Total Labor	6.26 cents/yd²	5.37 cents/yd²	3.36 cents/yd²
Labor Required To Harvest One Acre (Hours)	95.4	84.7	45.3
Average Hourly Wage	$3.02	$2.92	$3.41

Table 3. Average Cost of Harvest Machinery and Equipment by Various Methods of Harvest, Maryland, 1976

Item	Method of Harvest					
	Hand Directed Hand Rolled		Tractor Powered, Hand Rolled		Palletizer, Palletized Handling	
	$/acre	cents/yd²	$/acre	cents/yd²	$/acre	cents/yd²
Depreciation	49.41	1.074	48.69	1.058	60.19	1.308
Repairs	15.44	0.336	15.21	0.331	18.81	0.409
Insurance	1.85	0.040	1.83	0.040	2.26	0.049
Interest	15.75	0.342	15.52	0.337	19.18	0.417
Average Fixed Cost	82.45	1.792	81.25	1.766	100.44	2.183
Gas and Oil	6.20	0.135	25.54	0.555	40.74	0.886
Blades	27.50	0.598	27.50	0.598	27.50	0.598
Replacement Pallets	—		—		42.27	0.919
Average Variable Cost	33.70	0.733	53.04	1.153	110.51	2.403
Average Total Cost	116.15	2.525	134.29	2.919	210.95	4.586

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Fixed, variable and total costs for harvest machinery and equipment are reported in Table 3. Average fixed costs for hand-directed and tractor-powered methods of harvest are approximately equal. This was true even though the tractor-powered method was more capital intensive. This resulted from producers using the tractor-powered method to harvest about three times as many acres of turfgrass as those producers who used the hand-directed method. Average fixed cost for the palletizer was not offset by the increased acreage harvested and averaged $100.44 per acre, or approximately 24 percent more than the average fixed costs per acre for the tractor-powered hand rolled method of harvest.

Average variable costs for the palletized method of harvest accounted for much of the difference in average total cost for the three methods. The cost of additional gasoline, oil and replacement pallets accounted for the difference in average variable cost between the palletizer and the other two methods. Blade expense was constant for each method of harvest since deterioration of the blade was affected by the soil condition and not so much by the method of harvest. An average of one blade per acre harvested was used as the basis for this cost. Average variable cost for machinery and equipment (forklift, palletizer, tractor, pallets, fuel and oil) for the palletizer method was $110.51 per acre or 228 percent more than the $33.70 per acre cost for the hand-directed, hand rolled system and 108 percent more than the $53.04 per acre cost for the tractor-powered, hand rolled system of harvest.

Average total cost for machinery and equipment for the palletized method was $210.95 per acre or 82 percent more than the $116.15 total per acre cost for the hand-directed, hand rolled method and 57 percent more than the $134.29 cost for the tractor powered, hand rolled system of harvest (Table 3).

Individuals who perform harvest and delivery operations of turfgrass are continually charged with the responsibility of securing an adequate market for their product and services. Sales and administrative costs of performing this responsibility in the form of advertising, secretarial and bookkeeping services, office and utility expenses were $207.04 per acre harvested, or 4.501 cents per square yard of harvested turfgrass.

Total harvest cost (including sales and administrative costs, labor and machinery costs) was $572.46 per acre (12.445 cents per square yard) for the palletizer method. Individuals who used the hand-directed, hand-rolled system had the highest total harvest cost of $611.30 per acre, or 13.289 cents per square yard, while the tractor-powered, hand-rolled method had total harvest costs of $588.65 per acre, or 12.797 cents per square yard.[4]

The average cost for two methods of delivery of turfgrass is shown in Table 4. Costs for each method were based on the assumption that each delivery was made at maximum truck capacity to a single destination. Although most individuals reported this to be the usual case, some sent trucks that made more than one delivery stop and/or trucks that were partially loaded. Both of these conditions would increase the calculated average cost per yard for delivery of turfgrass for any single trip.

Table 4. Delivery Expense: Average Cost of Transportation by Alternative Methods, Maryland, 1976[a]

Item	Method I	Method II
	cents/yd²	cents/yd²
Depreciation	2.195	2.443
Repairs	1.164	1.571
Taxes (Tags)	0.421	0.393
Interest	0.866	0.964
Insurance	0.817	0.595
Average Fixed Cost	5.463	5.966
Labor	3.129	2.100
Gas and Oil	2.177	1.232
Average Variable Cost	5.306	3.332
Average Total Cost	10.769	9.298

[a]The trucks used for delivery were valued at $10,975 and $24,425 for Methods I and II, respectively. Depreciation was based on an expected useful life of five years, with 30 percent salvage value. Interest was charged at 8.5 percent of average investment while repairs, tags and insurance were computed from grower responses. Method I transported 350-400 yards of sod and Method II transported 650-700 yards of sod. Most palletized sod was transported under Method II, but each method could transport either rolled or palletized sod. Method II was equipped with a stationary boom to facilitate unloading.

Costs for each segment of the integrated turfgrass industry including production through transportation were developed for various sizes of farms and methods employed in producing, harvesting and marketing turfgrass. Average total cost for each combination of production, harvest and transportation including the options to purchase by the acre, sell by the acre, or sell harvested f.o.b. at the farm is reported in Table 5.

Although all possible combinations are reported in Table 5, several represent unlikely combinations of farm size and harvest technique. For example, costs reported for the smaller farms employing the highly mechanized harvest techniques may be understated and may lead to inflated estimates of the return to management. As described in footnote 4, costs for the various harvest practices were based on stated acreages that may not be attained each year by the smaller producers. However, some could reach the required size by increasing harvested acres through custom work for other farmers. Also, to produce turfgrass of comparable quality as that found on farms with greater than 300 acres, producers with farms of 100-150 acres and 151-300 acres would have to increase many of their variable production inputs. Table 1 shows that variable inputs for seed, fertilizer and herbicide were applied on the largest turfgrass farms at a greater expense per acre than on farms with 100-150 or 151-300 acres. Producers did this to insure adequate growth as well as improve the appearance of their product in order to command a premium price. Increasing the variable inputs used on the smaller farms to levels used on the largest farms would increase total costs

Table 5. Average Total Cost by Size of Farm and Level of Integration, Maryland, 1976

Production Option	No Harvest	Harvest Option (Including Sales and Administrative Costs)[a]			Transportation Option
		Hand-Directed Hand-Rolled	Tractor-Powered Hand Rolled	Palletizer, Palletized Handling	
	cents/yd²	cents/yd²	cents/yd²	cents/yd²	
Purchase by the Acre[b]	——	27.574	27.082	26.730	f.o.b. farm
	——	38.343	37.851	37.499	Method I
	——	36.872	36.380	36.028	Method II
Produce Less Than 100 Acres	13.481	26.770	26.278	25.926	f.o.b. farm
	——	37.539	37.047	36.695	Method I
	——	36.068	35.576	35.224	Method II
Produce 100-150 Acres	11.620	24.909	24.417	24.065	f.o.b. farm
	——	35.678	35.186	34.834	Method I
	——	34,207	33.715	33.363	Method II
Produce 151-300 Acres	10.878	24.167	23.675	23.323	f.o.b. farm
	——	34.936	34.444	34.092	Method I
	——	33.465	32.973	32.621	Method II
Produce Greater Than 300 Acres	12.161	25.450	24.958	24.606	f.o.b. farm
	——	36.219	35.727	35.375	Method I
	——	34.748	34.256	33.904	Method II

[a]Sales and administrative costs were 4.501 cents per square yard of harvested turfgrass.

[b]In lieu of production costs for those not producing turfgrass, the average price of $657.09 per acre for unharvested turfgrass was used in the cost calculation.

of production, thereby decreasing returns to management to less than that earned on the larger farms if all farms received the same price.

Return to management for various farm sizes, methods of harvest, methods of transportation, as well as the option to purchase turfgrass by the acre for later harvest and delivery is presented in Table 6. In determining the return to management, gross receipts for f.o.b. at the farm were based on a harvest of 4,600 square yards per acre and a harvest price of 55.3 cents per square yard. The price for delivered turfgrass was 70.8 cents per square yard. Purchase by the acre costs were based on the reported average price of $657.09 per acre for unharvested turfgrass. The other costs, other than management, were based on information in Tables 1-4 plus sales and administrative costs of 4.501 cents per square yard of harvested turfgrass. These costs are summarized in Table 5.

Table 6 shows that return to management ranged from a low of 28.530 cents per square yard on farms with less than 100 acres selling turfgrass f.o.b. at the farm (hand-directed harvest) to a high of 38.179 cents per square yard on farms with 151-300 acres where the palletizer was used to harvest and Method II was used to deliver turfgrass. **WTT**

(Table 6 is located on page 54.)

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KUBOTA®

Kubota L-185 tractor (17 h.p.) shown with mid-mount mower.

Table 6. Return to Management from the Sale and Transportation of Harvested Turfgrass by Alternative Methods of Production, Harvest and Transportation, Maryland, 1976[a]

Production Option and/or Size	Method of Harvest: Hand Directed, Hand Rolled	Method of Harvest: Tractor Powered Hand Rolled	Method of Harvest: Palletizer, Palletized Handling	Transportation Option
	cents/yd²	cents/yd²	cents/yd²	
Purchase by the Acre	32.457	32.949	33.301	Method I
	33.928	34.420	34.772	Method II
Produce Less Than 100 Acres	28.530	29.022	29.374	f.o.b. at farm
	33.261	33.753	34.105	Method I
	34.732	35.224	35.576	Method II
Produce 100-150 Acres	30.391	30.883	31.235	f.o.b. at farm
	35.122	35.614	35.966	Method I
	36.593	37.085	37.437	Method II
Produce 151-300 Acres	31.133	31.625	31.977	f.o.b. at farm
	35.864	36.356	36.708	Method I
	37.335	37.827	38.179	Method II
Produce Greater Than 300 Acres	29.850	30.342	30.694	f.o.b. at farm
	34.581	35.073	35.425	Method I
	36.052	36.544	36.896	Method II

[a]Method I transports 350-400 square yards of sod and Method II transports 650-700 square yards of sod. Most palletized sod is transported under Method II, but each method can transport either rolled or palletized sod. Returns on farms with 150 acres or less of turfgrass which harvested using the tractor-powered, hand rolled or the palletizer method are believed to be in excess of what could have been earned. In 1976, these farms did not harvest a sufficient volume of turf (at least 42.5 acres and 70.6 acres per machine per year for the two mechanized methods, respectively) to justify the harvesting costs which are implicit in the return to management. Returns to farms in the 151-300 acre range are also believed to be in excess of what could have been earned in 1976. Farms in this group generally produced turfgrass using a less intensive production schedule which would have been sold at a lesser price if it was sold on a harvested basis. Returns to management would thereby be decreased below those reported.

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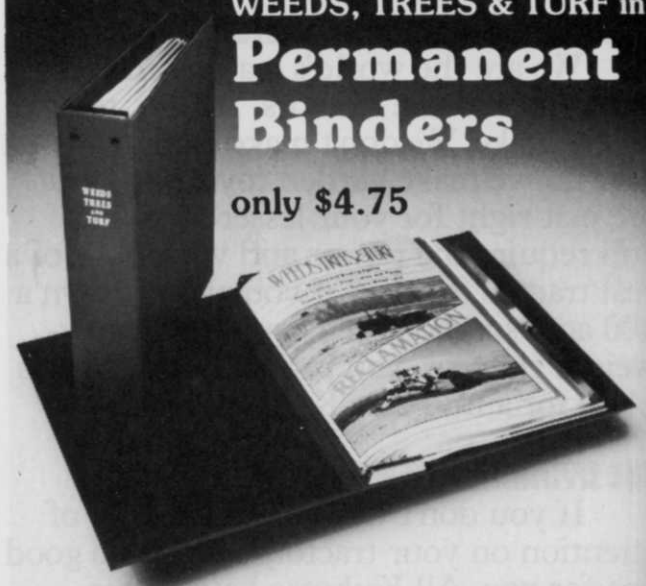

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How healthy are your trees?

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—Stunting or unnatural dwarfing
—Lack of terminal growth
—Die back, dying of branches
—Inability to ward off and/or heal from insect, disease and/or adverse weather conditions.

If you have noticed any of these symptoms, answer this question ———

When was the last time you fed your trees, evergreens, shrubs & perennial ornamentals?

Inadequate nutrition is frequently the basic cause for most of these problems.

Most perennial ornamentals are planted in undesirable soils and are forced to grow under unnatural conditions. This places a great deal of added stress upon these plants.

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Note: Training seminars available in October, November and December 1978, and January and February 1979

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VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Q: *I have read several articles recommending fall fertilization, yet some of my clients refuse to let me fertilize their trees in the fall since they say the trees aren't growing and the fertilizer is wasted. What can I tell them?*

A: Even though stem or foliar growth may not be evident, the root system of trees can continue growing until the soil temperature approaches freezing. The fertilizer elements are absorbed by the roots and combine with stored sugars to produce all the other necessary compounds for cellular growth and function. Therefore, fall is an excellent time to stimulate an extensive root system which results in a stronger, healthier tree.

Q: *I was recently told not to use Casoron on white pine and Norway spruce, but I looked on the label and found pine and spruce listed. Doesn't that mean it is OK to use?*

A: You must have an old container. Pine and spruce are no longer on the Casoron label. I checked with Thompson-Hayward, basic producers of Casoron, and was told that side applications may cause a buildup of the chemical near the trunk and cause injury to *Pinus* and *Picea* species.

Q: *What is the best method for treating chlorotic pin oaks? I have tried several methods with no results.*

A: Assuming that the leaves are displaying an interveinal yellowing, the cause is probably a lack of available iron. However, other factors can cause similar symptoms, and if the tree does not respond to recommended iron treatments, other possible problems should be considered. Wetwood, a vascular bacterial disease may aggravate an iron deficiency and prevent satisfactory response to treatments.

Trunk injections of dry or liquid iron salts are the most consistently effective treatments for iron deficiency chlorosis. Our tests have shown ferric citrate and ferric ammonium citrate to elicit the best response of the many iron compounds available. In most cases, the response is improved with soil-applied fertilizer.

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Trunk injections may have to be repeated in a few years unless the soil problem causing a deficiency of available iron is corrected. Soil applications of iron chelate may maintain a sufficient level of available iron and attempts to improve the soil pH are sometimes successful, particularly if the soil is somewhat sandy. If the trees are irrigated, the pH of the water should also be tested.

Q: *I would like to use a dye this fall instead of overseeding with a cool-season grass. Can I spray it on just before the grass turns brown or will it injure my bermudagrass?*

A: The turfgrass colorants are not phytotoxic to grass if applied according to instructions. However, if you apply it while the grass is still growing, you may end up mowing off the colored leaves. The best policy is to wait until the grass goes dormant.

Q: *When is the best time to seed a heavily shaded area in the Northeast?*

A: Spring. Seed as early as possible to provide the maximum establishment period before the trees foliate. You could also seed in mid- to late November and let the seed overwinter if the area is difficult to work in the spring. Autumn establishment may be difficult because of fallen leaves.

If the area is too heavily shaded to allow turfgrass growth, you may want to consider ground covers.

Q: *I would like to know if liming really helps control thatch.*

A: If the pH of the thatch layer is too acid for the optimum growth and activities of the microorganisms responsible for thatch decomposition, light frequent applications of lime will enhance biological thatch control. Although recommendations vary, a rate of one to two pounds of hydrated lime per 1000 square feet every two weeks has been successful.

It should be remembered that, even though the thatch layer is acid, the underlying soil may be near neutral to alkaline and additions of lime could have an adverse effect on soil reaction.

Q: *How do you use herbicides around nursery plantings?*

A: Read the label and apply the herbicides according to instruction *only* to the plants listed.

The herbicide choice is affected by the nursery plant species, the problem weeds, soil type and the application technique and timing that is best for your particular nursery operation. **WTT**

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Found: A tested way for you to cut Snowmold control costs 50%

Spray additives Exhalt®800 and Exhalt4-10 can reduce turf maintenance costs sharply by increasing fungicide life and minimizing Winterkill hazards.

Perhaps nothing in the professional turf world is more universally frustrating than the menace of fungus diseases. The battleground is wide and deep, ranging from far north to deep south and encompassing both of the major Snowmold species. Even so, there's little need for gloom.

Because, at last, Exhalt spray additives are blunting the destruction of these insidious diseases wherever they flourish.

The kinds of Snowmold

Pink Snowmold (Fusarium nivale, Fusarium rot, or Fusarium patch) attacks both northern and southern grasses, but it's worse in the south. It ravages turf in late fall, winter or early spring — with or without snowcover. To do their damage, ever-present fungus spores need only ideal conditions. Unfortunately, Pink Snowmold can be destructive under melting snow or at temperatures as high as 80° F

Gray Snowmold (Typhula itoana) — also called snowscald or winter scorch — is a bugaboo both north and south, but it's worse in the north. Snow is not a requisite, but it aggravates the disease. It appears after the first thaw.

For control purposes, the *kind* of Snowmold is inconsequential. What counts is the *efficiency and the lifespan of the fungicide.* The need to improve them prompted the development of Exhalt spray additives. And they're causing a revolution.

Of course, nobody can promise foolproof cures for diseases as complex as Snowmolds. They differ in kind and severity; they're subject to weather vagaries. If there's *one constant* in this fungus jungle, perhaps it's this: *timing.*

The *TIMING* of the treatment is all-important.

And while we can't presume to know the intricacies of *your* disease problems, we can offer some reliable guidelines:

1) *Do not* apply nitrogenous fertilizers in late fall; let the grass "harden off" instead.
2) *Do* remove thatch; it's a fertile breeding ground for Snowmold mycelia.
3) Remember and use these Gordon spray additives:

Exhalt800, which extends fungicide life as much as two or three times.

And **Exhalt4-10,** which reduces plant moisture loss and lessens the threat of winterkill.

As you shall see, they can help you in three important ways.

Snowmold in the North

When the ground freezes, apply fungicide combined with Exhalt800 after the first hard frost, when the growth has stopped. This sticker-extender encapsulates and protects the fungicide against wash-off and weathering. It even stretches and flexes to remain intact even if grass grows during unseasonably warm days.

Finally, when you're sure *all growth* is finished, apply Exhalt4-10 — the "overcoat" that even further guards against fungus attack. Application is at the rate of one gallon Exhalt4-10 to 10 gallons of water.

Snowmold and Winterkill in the South

Here, the problem can be even more stubborn because grass may grow all winter, requiring from one to four fungicide treatments between late November and April. Use Exhalt800 with every spray.

If cold weather stops grass growth, then apply Exhalt4-10, the "overcoat" that minimizes the risk of Winterkill.

If the ground freezes, apply Exhalt4-10 at once to avoid Winterkill. Winterkill is caused by the turf trying to pump ice out of the ground so the grass can transpire. Exhalt4-10, by cutting the "pumping rate" almost 50%, gives your grass a better chance to survive.

Shrubs, too, benefit from the Winterkill protection of Exhalt4-10 — especially conifers that hold their needles in winter. Here the application rate is one gallon of Exhalt4-10 to four gallons of water.

Low-cost protection in any climate

If you've had it with rising fungicide prices, high labor costs, the drudgery of turf repair . . . now you can fight back! First, add Exhalt800. Compared with the alternatives, the cost is miniscule. Add only one pint to 100 gallons of spray. It can double the fungicide control period, reduce material costs at least 50%, and save expensive labor.

Finally, when conditions are right, apply Exhalt4-10 to suppress Winterkill.

Exhalt800 . . . Exhalt4-10 . . . today's best weapons against Snowmold and Winterkill. Get complete information from the man who sells TRIMEC® herbicide and companion turf products — *your local authorized Gordon distributor.*

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Turf management 1979: Why it should start with TRIMEC® applied late this fall

Late fall dandelion control, not feasible before Trimec, today offers year-round benefits only Trimec can provide. Balanced workloads and ideal seasonal timing are two.

For you, the professional turf manager whose work bears the public spotlight, dandelions can be the scourge of the earth. They're ugly. Costly. Time-wasting. An irritant to everyone, both in and out of management. Dandelions — the turf spoilers. They've got to go!

But, before Trimec, the only dependable time to wipe out dandelions was spring — ideally, early spring (which is usually the windiest, rainiest, muddiest spray season of the year). Alternatives? None. Just spray — and let the other work wait.

And spray you did. But not without the knowledge that your gains would be short-lived. Because, in a few weeks, the *second* weedcrop would beg attention — Plantain, sorrel, chickweed, thistle (and more dandelions) — all flourishing because they sprouted too late for your *early* spray.

Obviously, the ideal time for controlling dandelions is late fall. But, before Trimec, you couldn't develop an effective fall program for controlling them, because even the best herbicides lacked cool-weather power.

Then Trimec was invented

Trimec is today's advanced herbicide that lets you wipe out most dandelions, and virtually all other broadleaf weeds, at the ideal time — mid-October to late November — in 50° temperature or cooler. This shifts much of the heavy spring workload to fall, when you have more time. Besides, your spring turf will be almost completely dandelion-free — having a few stragglers at most.

With a *fall* spray, you can skip the *early spring* dandelion treatment. And since you won't have to apply your main weed control until four to six weeks later, you'll have gained a month or more for other management functions — planning, maintenance, training, and so on. *Count the benefits:*

(1) **Late this fall** your sprays likely will encounter less wind, rain and mud than they would in February or March next year. Ornamentals, going dormant, are less prone to drift damage (they won't have spring's tender buds and foliage). Mowing is finished, reseeding completed; you have more time to work with your spray crew. And new grass is mature enough to resist herbicide damage.

(2) **Early next spring** you won't be plagued with that early rash of dandelions — you'll have killed virtually all of them last fall.

(3) **Later next spring,** four to six weeks later, your main Trimec application will get practically all the weeds then growing. Certainly, the timing fits better into your work schedule.

(4) **In all seasons** you can better manage your time for peak efficiency and balance the seasonal workloads, thus improve all of your management functions.

The Trimec formulation makes it possible

It's unique. Patent-protected. More effective, more cost-efficient than any other broadleaf herbicide. The ingredients themselves are not uncommon: 2,4-D, MCPP and Dicamba are well-known. But combined in the exclusive Trimec way their *synergism* (the interaction of the components) releases weedkill power much greater than the sum of their strength when used separately. Thus, even the uncommonly small amounts of Trimec chemicals become highly efficient.

The result is that acre for acre, dollar for dollar, weedkill for weedkill, Trimec costs less than any other herbicide. Field experience and test after test have proved it. Trimec also poses less threat to grasses, trees, flowers and ornamentals because there is little root absorption. The risk of drift damage is reduced, as well. Biodegradeable, trouble-free and gentle, Trimec is precisely formulated to eliminate the hazard of on-site mixing errors. Only Trimec has all these advantages:

- Controls the widest range of broadleaf weeds
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- Wide safety margin for lawn grasses, ornamentals
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- Effective weed control in wide temperature range
- Unique formula overcomes water hardness problems
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- Non-flammable and non-corrosive in use
- Product stable several years above 32° F.
- Biodegradeable: friendly to the environment

Sorting out the values

If you've been making unreasonable sacrifices of personal time and family interests to meet the demands of your work, Trimec is one way to give yourself a break.

See your local authorized Gordon Distributor. He stocks many superior turf products, including Trimec and Trimec Bentgrass formula, and can share some helpful experience in dandelion control. Give him a call today.

Trimec® is a registered trademark of PBI/GORDON Corporation. U.S. patent No. 3,284,186.

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PROSCAPE

By Michael Hurdzan, Ph.D., golf course designer and consultant

Q: *What is buffer pH?*

A: Buffer pH is a measure of the slowly changing chemical properties of soil particles, not the soil solution. Soil pH is usually measured by mixing a small amount of air dry soil with an equal amount of water and using a calibrated electrode probe to measure the hydrogen concentration of the soil. Since this measurement is of the soil water, it may vary greatly depending upon any soil amendment that had been added. For instance, if the soil was recently limed, one would expect the pH to be higher than that of the soil particle.

Since the soil solution pH is so variable, many soil test labs include a measure of buffer pH, which is a measure of the acidity or alkalinity of the soil particles and not the soil solution.

However, remember that it is the soil solution that most influences nutrient uptake and hence plant growth. Manage the soil water and you manage the plant growth.

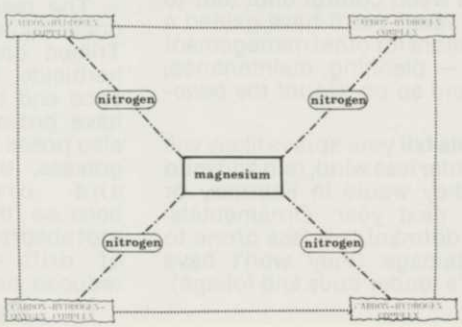
Q: *What causes chlorosis?*

A: As most are aware, chlorosis is a term applied to abnormal yellow color of plant parts caused by poor chlorophyll production. The yellowish symptom is most often caused by a nutrient deficiency, but it also can be caused by insect or disease injury, improper air-water conditions in the root zone, or other chemical or physical injury.

From a nutrient standpoint, the chlorophyll molecule is complex and many elements are needed to construct it. Carbon, hydrogen, nitrogen, oxygen, and magnesium make up chlorophyll and a shortage of any of these elements, especially nitrogen and magnesium, restricts its production. In addition, many intermediate steps in chlorophyll production depend upon adequate amounts of iron, sulfur, manganese, copper, zinc, and other elements. However, most often lacking are nitrogen and iron since they are relatively mobile and easily lost.

Reoccurrence of chlorosis can be minimized by frequent application of elemental nitrogen and iron, or a less frequent application of slow-release nitrogen and chelated iron. Chelated iron is iron combined with an organic carrier which breaks doen slowly in the soil. A sensible fertilization program including micronutrients should prevent chlorosis. **WTT**

Chlorophyll Molecule



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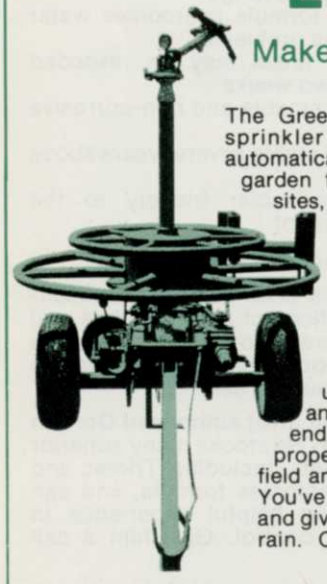

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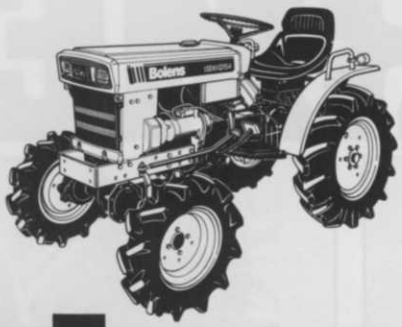

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*Mfr's suggested retail price for 15 hp 4-wheel drive tractor w/o attachments. 2-wheel and 4-wheel drive tractors available in 15 and 17 hp. Does not include freight, setup charges, or local taxes.

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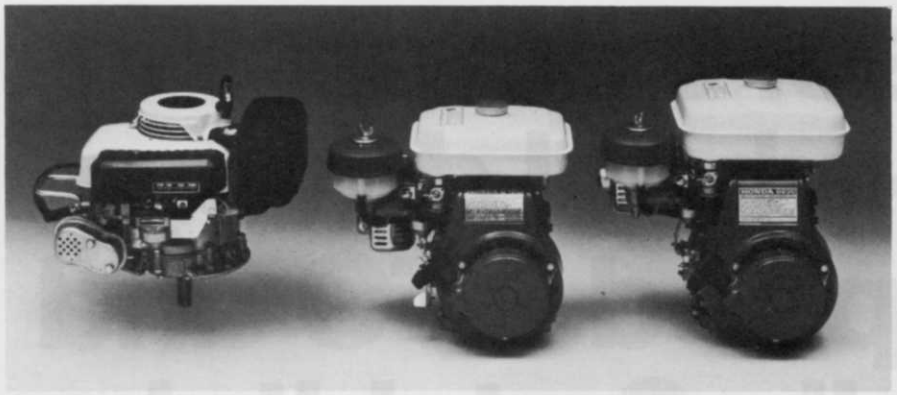
PRODUCTS



General purpose engines from Honda in the three to five hp range are now available. The engines are four-stroke, single-cylinder, side-valve, and forced-air-cooled. The GV-150 and GV-150A models develop 3.5 hp, have 144 cc displacement, and either horizontal or vertical shaft. The G-200 is a 5 hp, horizontal shaft engine with 197 cc displacement. The smaller engines develop more than five ft. lbs. torque and the larger model develops nearly eight ft. lbs.

Circle 701 on free information card

Trailer for heavy equipment by Life-Time Products can haul up to ten tons of cargo. The trailer features an 8x20-ft. platform, four-ft. beavertail, dual axles, electric brakes, ten-ply tires, and three-in. I.D. eye pintle hitch. A goose-neck style hitch is optional. The trailer has a loaded height of 32-in.

Circle 702 on free information card

VERMEER...

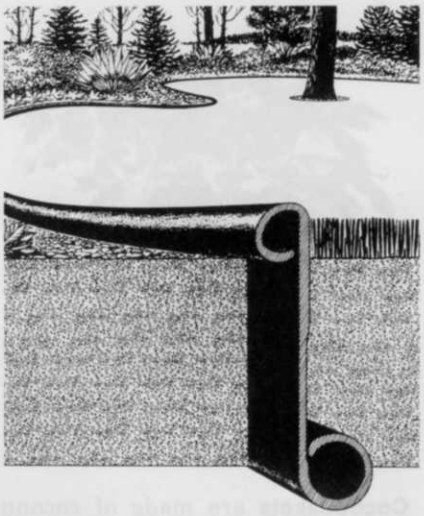
Transplanting Trees? Removing Stumps? Installing Underground Service Lines? Cutting Tree Roots Under Sidewalks? Splitting Firewood? Vermeer Cuts Your Costs . . . In Equipment . . . In Labor . . . In Minutes!

Vermeer Tree Spades. Patented tree-moving/tree-packaging machines that automatically dig, ball, transport and replant shrubs and trees up to 25 ft. in height. Tractor-mounted, trailer-mounted, or truck-mounted units—plus complete multi-purpose landscaping machines that handle a tremendous assortment of dirt-handling functions in addition to transplanting trees.

Vermeer Trenchers. Multi-purpose underground machines with a wide variety of money-saving dirt-handling attachments. On tracks or rubber tires. With power ranges from 18 to 195 hp. With digging capacities of 4-36 in. wide, down to 12 ft. deep. Vermeer Vibratory Plows, for installing cable directly underground without damaging finished surfaces or landscapes.

Electrostatic crop spraying system by Eclipse Systems Inc. uses electrical attraction to reduce drift and dissipation and to increase dispersion of the spray pattern. It is a retrofit to all conventional spraying systems and not a totally new installation. The manufacturer claims a 50 percent savings on insecticides with the system.

Circle 703 on free information card



Plastic edging by Ryerson holds landscape design lines and prevents encroachment of grass and weeds into planted areas. The 25-ft. sections are self-locking and the bottom lip back fills with soil during installation for positive holddown without stakes. Prices range from 39-64 cents per ft.

Circle 704 on free information card

IN MINUTES

ermeer Stump Cutters. Fastest, asiest, most economical method removing tree stumps. With ur powerful machines, each quipped with a big hydraulically ontrolled cutting wheel that ctually chews even large stumps chips 6-24 in. below the surface . . . minutes!

Vermeer Root Cutter. A great preventative maintenance machine that severs tree roots before they buckle sidewalks or streets. Vermeer Log Splitters, available as self-contained units or designed to operate off the hydraulic system of your tractor. Instant firewood . . . with 22,000 lbs. of force.

Sure, We Demonstrate . . . Ask Us!

Vermeer

THE DIGGIN' DUTCHMAN

6110 NEW SHARON RD • PELLA, IOWA 50219 • (515) 628-3141

Circle 109 on free information card

CocoBaskets are made of coconut husk fiber and provide plants with sustained moisture, controlled warmth, good drainage, and optimum root aeration. No liner is required and the CocoBaskets allow plants to root freely into the fiber and therefore direct planting into another growing medium. They are available with or without wire hangers in 8, 10, 12-in. diameters.

Circle 705 on free information card

New Ford backhoes provide increased lift capacity and digging capability. An extendable dipperstick is optional on the 15-ft. model which permits a digging reach of 23-ft. Twelve and fourteen ft. models are also available. Digging force has been improved by increased hydraulic pressure, larger boom and crowd cylinders, new bucket geometry, and stronger bucket pins and header plates.

Circle 706 on free information card

Cut It!

Cut your grass and cut your risks with Mott flail safe mowers. Under conditions wet or dry, Mott cuts and mulches everything from fine lawns to high weeds.

Cutting widths from 38 to 88 inches and gangs to 19 feet. Mott mowers have built-in Long Life Durability and for you this means Best Value Purchase.

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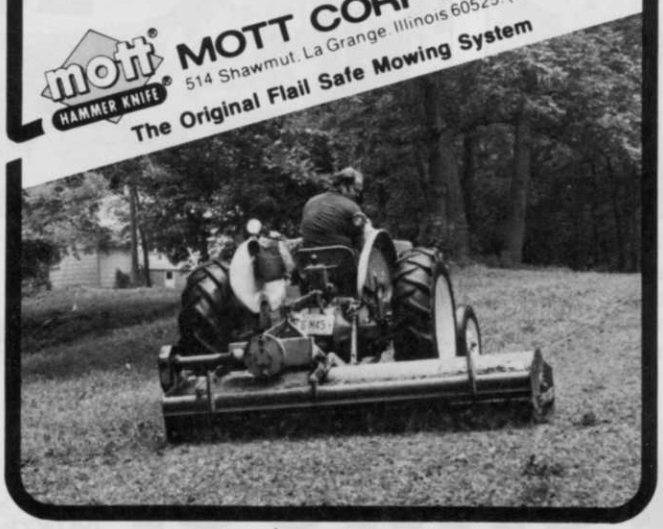
MOTT CORPORATION
514 Shawmut, La Grange, Illinois 60525 (312) 354-7220

The Original Flail Safe Mowing System

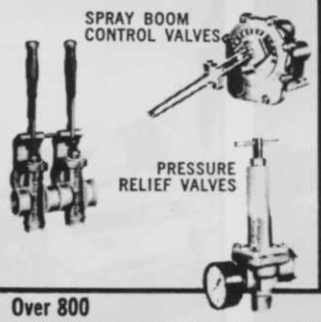


Circle 101 on free information card

SPRAYING SYSTEMS CO.

TeeJet®

SPRAY NOZZLES AND ACCESSORIES



Over 800
INTERCHANGEABLE SPRAY TIP TYPES AND CAPACITIES...
tapered edge, even and wide angle flat spray... hollow and full cone... disc type hollow and full cone... and flow regulators. The most complete line for spraying herbicides, insecticides, fungicides, liquid fertilizers and foam solutions. All materials. *For complete information write for Catalog 36... and for foam spraying ask for Data Sheets 13602 and 13626.*

SPRAYING SYSTEMS CO.
North Ave. at Schmale Rd., Wheaton, Ill. 60187
Telephone: 312 665-5000 / Telex No. 72-8409

PROMPT SHIPMENT FROM STOCK

Circle 116 on free information card

PTO-driven blower by Atwater Strong enables a tractor operator to sweep 60-ft. swaths of leaves or trash. The Lo-Blow blows right or left and has finger tip controls on the tractor.

Circle 707 on free information card

Ten hp, single cylinder, four-cycle engine by Briggs & Stratton Corp. is designed for rugged service. The 22-cu. in. displacement engine has an aluminum alloy cylinder with chrome-plated piston for longer life and better heat dissipation. A static balanced crankshaft and shorter piston stroke minimize vibration. The engine is available in horizontal or vertical crankshaft models.

Circle 708 on free information card

Get GREATER USE and VALUE from your Chain Saw with GRANBERG Lumber Mills and Equipment

Now make smooth, ready-to-use Lumber

from your own trees and logs – where they fall and mill them to thicknesses from ½" to 14". Build low cost fences, sheds, outdoor furniture, etc.

Sharpen your saw chain fast and easy

like a professional and save – with our Manual or Electric Sharpeners.

FILE-N-JOINT® Dial setting accuracy. File guide clamps to bar for easy on-the-job sharpening.

Precision Electric
GRIND-N-JOINT SHARPENER

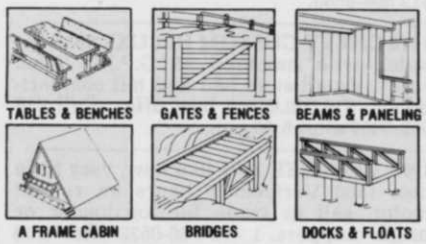
Fast and compact, Works off car or truck battery. Sharpens cutters and lowers depth gauges. Has 35 degree built-in angle marks and depth gauge attachment.

BREAK-N-MEND

BREAKER & RIVET SPINNER

Combination Tool for repairs on or off the bar. Anvils adjust for all chain pitches to ⅜".

MAKE YOUR OWN LUMBER AND BUILD THESE



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WTT-10
Send colorful FREE literature and location of nearest dealer.

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Company_____

Address_____

City_____ State_____ Zip_____

Circle 136 on free information card

CLASSIFIEDS

USED EQUIPMENT

2 — 50' AERIAL BASKETS, brush chipper, stump cutter, 2 sprayers, small crane. Parkway Tree Service, 12026 West Cherry St., Wauwatosa, Wisconsin 53226. 414 257-1555.

LAWN SPRAY TRUCKS: 1978 I.H. 24,000 GVW, 15,000 miles, $10,500. 1977 Ford F-750 24,00 GVW, 14,000 miles, $11,500. Both fully equipped with 1500 gallon epoxy lined steel tanks, stainless steel mechanical agitation, PTO driven Bean pump, hose, reel and gun. Please call 312 293-1036.

USED CHIPPERS, skyworkers, Arlo cranes and hydro-ax's. Please call P. C. Gould Sales Company, Box 178, Essex, Conn. 06426. 203 767-1636, Phil or Jeff Gould.

1970 HI-RANGER on F-600 Ford, chipbox, side tool boxes. $21,500.00. Hydro-ax-model 500, $40,000.00, Osborne Tree Service, Mentor, Ohio 44060. 216 951-4355.

LIQUID LAWN CARE EQUIPMENT. 3-1300 gallon tank trucks complete. 1974, 75, 76 GMC new pumps. Ready to make $. Will sacrifice, trades considered. Cleveland, Ohio. 216 255-3131.

VERMEER TS44A tree spade, 1978 model, used very little, reasonable priced. Phone 218 233-4465 or 236-1838.

USED 16" MITTS & MERRILL chipper in good condtion. Large winch (20) ton. Phone 614 753-3628.

1977 FINN STRAW MULCHER "Eagle" asphalt tank (500 gal.), straw crimper, like new, used on only 25 acres, $10,800.00. 1968 Bowie hydro mulcher, 1500 gal. capacity, very good condition, $6,500.00. 1969 "350" John Deere "Cat"/loader with 4/1 bucket, $10,500.00. "Hawk" bucket for above machine, $400.00. 1973 John Deere "301" tractor loader, $7,500.00. 1973 John Deere "401" tractor loader, $8,750.00. 1974 John Deere "302" tractor loader, $9,-500.00. Emerald Green Sod Farms, Inc. 312 898-8680.

1978 CHEVY CUSTOM DELUXE 30, 4,544 miles with mounted 35 G.P.M. Beam spray, rig-all steel bed and toll compartments, $10,000.00 or best offer. Call 616 983-0459 after 6:00 p.m.

1974 VERMEER 2465 like new, very little use. 1560 Vermeer 0 hours on rebuilt motor, sell or trade for log loader or brush chippers. 1 413 786-0522 after 6:00 p.m.

FOR SALE: 13 new and 20 used 18" Ryan sod cutter blades. 716 434-5338.

SEEDS

SOD QUALITY Seeds: Adelphi, Glade, Cheri, Nugget, Merion, Fylking, Majestic, Baron & Touchdown bluegrasses, also fine fescues. Manhattan ryegrass. Custom mixing available. Michigan State Seed, Grand Ledge, Michigan 48837. Phone 517 627-2164.

HELP WANTED

BRANCH MANAGER — National automated lawn service presently in franchise market seeks experienced individual to start and head up company areas. Tremendous growth potential for one presently with liquid spray management experience. Send confidential resume to Lawn Doctor, Inc., P.O. Box 525, 142 Highway 34, Matawan, New Jersey 07747.

CITY OF PENSACOLA, FLORIDA desires a Parks Superintendent, $17,836 to $21,684 annually, this is a challenging position located on the Gulf Coast. Requires graduation from a four year college or university with specialization in landscaping architecture, horticulture, or a related field; and five years of progressive responsible experience in the cultivation and care of grounds, plants, shrubs, and trees of which two must have been in a supervisory capacity. This is a Civil Service position with full benefits. An Equal Opportunity Employer. Submit resumes by October 31, 1978 to: Alfred P. Bradley, Civil Service Director, P.O. Box 12910, Pensacola, FL 32521.

AGRICULTURALIST, HORTICULTURALIST/AGRONOMIST. Excellent opportunity to assume broad scope responsibilities for a major chemical lawn care company. Primary responsibility will involve research, training, and providing technical support to Branch Management Personnel. Successful candidate should have a Ph.D. in agriculture with specialization in agronomy and horticulture. Some experience in turf management or related fields. Salary commensurate with experience and job responsibilities. For confidential consideration, send resume and salary history to: Box 206, Weeds Trees and Turf, Box 6951, Cleveland, Ohio 44104.

ASSISTANT FOREMAN of Sod Production and Maintenance needed for large sod farm in the midwest. Required skills include farming experience, horticultural or agronomy background, mechanical ability. Please send resume to Box 203, Weeds, Trees & Turf, Box 6951, Cleveland, Ohio 44101.

MANAGER OF NEW LAWN CARE DIVISION — Established Houston, Texas

LAWN FERTILIZER SALES REPRESENTATIVE

The Andersons is a dynamic Midwest company with sales in excess of $600 million, a history of steady growth in the agribusiness and a unique philosophy and concern for its responsibility to customers, community and its employees.

Our continued growth and success has created an immediate opportunity for the individual with 3-5 years successful employment as a sales representative with emphasis in the turf and fertilizer areas. An educational background in business or agribusiness area would be most beneficial but is not essential.

The responsibility of this position will include promoting and developing new sales accounts for divisional fertilizer products plus continued servicing of established customers in northwest Ohio, Michigan and Indiana.

The Andersons offers excellent compensation programs, comprehensive company paid benefits including a liberal profit sharing plan, automobile and expenses plus excellent growth potential. For immediate action, please direct your resume, and salary requirements, in confidence, to:

The Andersons

Michael R. Hancock
Employment & Benefits Manager
P.O. Box 119
Maumee, Ohio 43537
(419) 893-5050

An Equal Opportunity Employer M/F

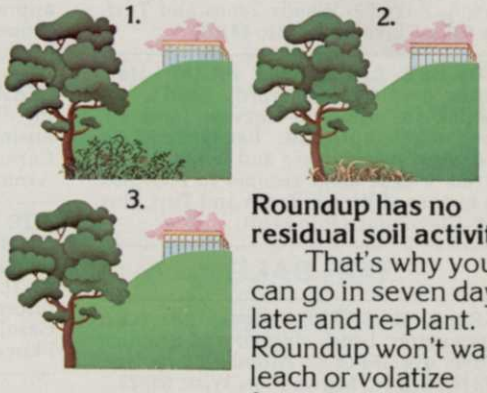
Roundup®. There's no better grooming aid for unruly turf.

Roundup® belongs in your turf renovation program.

Renovation of a weedy fairway, sod farm or other grassy area used to be a laborious and time-consuming chore, but not any more.

Not with Roundup® herbicide by Monsanto. Because one application of Roundup will control many annual and perennial weeds, yet allow you to proceed with tillage and planting operations as soon as seven days later.

Roundup also makes sense wherever treatments for grounds maintenance are called for. One man with Roundup in a backpack sprayer can replace many of the herbicides and frequent repeat treatments that are often necessary.



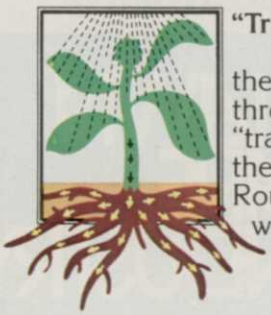
Roundup has no residual soil activity.

That's why you can go in seven days later and re-plant. Roundup won't wash, leach or volatize from the treated area to injure desirable vegetation. Naturally, normal precautions should be observed to avoid spray drift.

Roundup gets to the root of the problem.

Including many of your toughest vegetation problems, like: bluegrass, bermudagrass, quackgrass, bindweed, johnsongrass, fescue and vaseygrass.

Can you afford to let another season go by without Roundup in your turf renovation and grounds maintenance programs? Your local chemical dealer is the one to see for your supply of Roundup herbicide.



"Translocation" is the key.

Roundup is applied to the weed foliage, absorbed through the leaf surface, and "translocated" throughout the entire plant. In this way, Roundup destroys the entire weed, including the roots or rhizomes.

There's never been a herbicide like this before.

Monsanto

ALWAYS READ AND CAREFULLY FOLLOW THE LABEL DIRECTIONS FOR ROUNDUP HERBICIDE.

Roundup® is a registered trademark of Monsanto Company, St. Louis, Mo. © Monsanto Company, 1978.

RI78-04

Circle 121 on free information card

CLASSIFIEDS *Continued*

commercial grounds maintenance firm seeks experienced individual to start and operate a home lawn care division in this rapidly expanding market. The right person will receive excellent starting salary and company benefits with profit sharing potential. Send resume to Environmental, 7544 Harwin Drive, Houston, Texas 77036. 713 784-1750.

HELP WANTED. Manufacturers representative for Southeast turf grass sales. National Turf seed company seeking sales person to sell quality turf seeds to professional turf markets, Golf courses, etc. Territories available. Please send resume and complete details to this magazine. Box 207, Weeds Trees and Turf, Box 6951, Cleveland, Ohio 44101.

LARGE PROGRESSIVE CEMETERY in New York/New Jersey area, seeks experienced and professional grounds superintendent. We have monument, memorial park, indoor/outdoor mausoleum, lawn crypts. Good opportunity for the right person. Box 209, Weeds Trees and Turf, Box 6951, Cleveland, Ohio 44101.

MIDWEST AREA SOD FARM: Harvesting over 1,000,000 yards yearly, has opening for assistant harvest foreman. Mechanical aptitude, background in agronomy, horticulture and irrigation required. Please send resume to P.O. Box 202 in care of Weeds Trees and Turf, Box 6951, Cleveland, Ohio 44101.

FOR SALE

AERIAL BASKETS, digger-derricks, stump cutter, brush chipper and Prentice loader. 414 354-8730. Allied Enterprises, 9102 N. 75th St., Milwaukee, Wisc. 53223.

1. 2½ TON WENCH TRUCK; 2. 2-ton dump truck and chipper; 3. GMC 1-ton spray truck with 300 gallon sprayer on back; 4. 1-ton flatbed truck; 5. saw and equipment, including woodsplitter; 6. office furniture. Mine is the oldest and best known tree service company in Conroe in Huntsbille, Walker County and surrounding counties. I gross approximately $100,000.00 per year, with a four-man crew. I must sell due to ill-health. Only those interested, please call Maxie's Professional Tree Service of Conroe, Texas, 713 756-5888, or write P.O. Box 1218, Conroe, Texas 77301.

NINE HOLE GOLF COURSE and driving range. New pro shop and snack bar, 9 unit motel and 2 new housekeeping cottages. Includes all maintainance buildings and equipment. Two miles from Indian Lake, on the Cedar River in the heart of the Adirondacks. Price $200,000 firm. Inspection invited. Contact: 518 648-5244, Indian Lake, New York. President, Ricalbo In.

TREE SERVICE BUSINESS. Excellent reputation, very select clientele. Over thirty years in the finest location of affluent West Chester County, N.Y. Trucks, large sprayers, brush chipper, chain saws, miscellaneous tools, and equipment, office furnishings, industrial base radio, mobile units in trucks. Priced for quick sale, owner retiring. Box 322, Bedford, N.Y. 10506.

WISCONSIN — 9 Hole, 75 acres, additional 40 acres. Watered fairways, club house, cocktail lounge, pro shop, lockers, rental equipment. By owner, John Laridaen, R4, Mauston, Wisconsin 53948. Phone 608 847-7511.

WELL ESTABLISHED TREE SERVICE company private clientele in coastal Maine area. Box 210, Weeds Trees and Turf, Box 6951, Cleveland, Ohio 44101.

GOING CONNECTICUT tree service for sale. Grosses $100,000 plus. Price $40,-000.00. Respond to Box 208, Weeds Trees & Turf, Box 6951, Cleveland, Ohio 44101.

BUSINESS OPPORTUNITIES

WANT TO BUY OR SELL a golf course? Exclusively golf course transactions and appraisals. McKay Golf & Country Club Properties, 15553 N. East St., Lansing, Michigan 48906. Phone 517 484-7726.

LEARN LANDSCAPING and the Growing of Plants at home. Start a satisfying business or hobby. Free booklet. Lifetime Career Schools, Dept. A-404, 2251 Barry Avenue, Los Angeles, Ca. 90064.

FOR SALE: Tree removal company. Owner retiring after 15 years in same location. Will sell all or part including 2-70 ft. basket trucks. Call or write for information. Robbins Tree Service, 404 Caroline, Creve Coeur, Illinois 61611. Phone 309 699-7920.

REAL ESTATE

FOR SALE: A two farm sod operation in Eastern U.S. Reply Box 204, Weeds Trees & Turf, Box 6951, Cleveland, Ohio 44101.

POSITION WANTED

TOP MANAGER in the green industry wishes to relocate. Desires management or techincal director position. Ability to work with people. Masters degree in entomology plus marketing expertise. Box 205, Weeds Trees & Turf, Box 6951, Cleveland, Ohio 44101.

When answering ads where box number only is given, please address as follows: Box number, c/o Weeds Trees and Turf, Dorothy Lowe, Box 6951, Cleveland, Ohio 44101.

Rates: All classifications 65¢ per word. Box number, $1. All classified ads must be received by Publisher the 5th of the month preceding publication date and be accompanied by cash or money order covering full payment. Mail ad copy to: Dorothy Lowe, Weeds, Trees & Turf, P.O. Box 6951, Cleveland, Ohio 44101.

We stand out like a green thumb.

Because we're the only magazine to reach the entire residential lawn care service industry.

This is a growth market of 8,000 companies selling chemical lawn care and maintenance services to the 45 million home owner/residential turf market in the U.S.

A market with a 25% growth last year. And $1.25 billion in sales. And we hit the top management.

Stand out in the one magazine covering the fastest growing service industry in North America. Join us.

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LAWN CARE INDUSTRY

Manhattan Report:

You Can Develop A Professional Quality Football Field With Three Basic Elements.. Hands, Sand and Manhattan Seed.

HANDS, SAND AND SEED...

A new concept in building and establishing a professional quality football field has been developed through experimental work at the University of California, Davis. Because of sand's excellent drainage quality, crowning the field is not necessary. This makes this type football field adaptable to other sports and uses. The sand, hands and seed concept is applicable to other fields and courses, and has proven successful when adequate watering and fertilizing is maintained. Pictured here are a few of the steps in developing this versatile, durable and low cost athletic field.

Sand base is layered over the entire field. This provides adequate drainage during fall rainy periods in most climates. Finished grade is flat and no crown is needed.

A six-ton roller was used in this case to smooth the surface. This would not be possible with a soil field.

This is the field four months after seeding. A good irrigation program is essential to a quality field.

For more information on this innovative way to build a sand-based sports field write for our free booklet, which describes the step-by-step procedure of establishing a sand-based field.

MANHATTAN RYEGRASS GROWERS ASSN.
1349 Capital St. N.E.
Salem, Oregon 97303

Certified *Manhattan* TURF-TYPE PERENNIAL RYEGRASS

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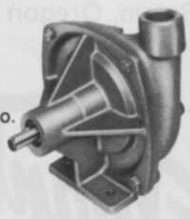
Get the right pressure at the nozzle...

Go Hypro all the way!

Big jobs or small jobs you need steady, reliable pressure at the nozzle. You get it with Hypro sprayer pumps and accessories: pressure for long discharge lines, for compact portable units, for fine spray or steady stream. That means time savings and application precision that can help you make more money. And Hypro dependability keeps your sprayer on the job, season after season. Get the facts. See your Hypro distributor or write us today.

Hypro High Speed Centrifugal Pumps. Belt driven. Models available for hydraulic, gear or engine drive, too. Capacities to 130 gpm. Pressures to 170 psi. Speeds to 6000 rpm.



Hypro Piston Pumps. The Series 5900. 20 gpm at 50 psi—plenty of output for proper agitation. Other Hypro piston pumps with capacities to 25 gpm.

Hypro offers a complete selection of sprayer accessories: gauges, strainers, agitators, ball valves and couplings, and a full line of valves and fittings.

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Circle 117 on free information card

WT&T

EVENTS

Florida Turf-Grass Annual Management Conference and Show, Sheraton Towers Hotel, Orlando, Fla., **Oct. 15-18.** Contact: Florida Turf-Grass Association, 1520 Edgewater Drive, Suite E., Orlando, Fla., 32804, phone: 305/425-1581.

The Irrigation Association Short Course Program, Wastewater Irrigation, Kansas City, Mo., **Oct. 17-19.** Call: 301/871-1200.

National Golf Foundation Fall Luncheon Meeting, The Registry Resort, Scottsdale, AZ, **Oct. 17.** Contact: NGF, 200 Castlewood Drive, North Palm Beach, FL 33409, 305/844-2500.

18th Annual Southern California Turf/Landscape Equipment & Materials Educational Exposition, Orange County Fairgrounds, Costa Mesa, Cal., **Oct. 18-19.** Call: 213/798-1715.

Southwest Turfgrass Conference, Texas Research Center at El Paso, Texas A&M University, El Paso, Tex., **Oct. 19-20.** Dr. Gerald Horst, Texas A&M University, Research Center at El Paso, 1380 A&M Circle, El Paso, Tex., 79927.

Western Garden Writers Symposium and Trade Show, Mansion Inn, Sacramento, Calif., **Oct. 21-23.** Call: 916/448-2881.

13th Annual Wisconsin Golf Turf Symposium, Pfister Hotel, Milwaukee, WI, **Oct. 25-26.** Contact: Bob Welch, 8500 S. 5th Avenue, Oak Creek, WI 53154. 414/764-2300.

Florida Nursery and Allied Trades Show, Curtis Hixon Convention Center, Tampa, Fla., **Oct. 27-29.** Contact: FNATS, Inc., 6535 E. Hillsborough Avenue, Tampa, Fla., 33600, phone: 813/626-4149.

Landscape Industry Cost Accounting Seminar, Empire Room, Newporter Inn, Newport Beach, Calif., **Oct. 28.** Call: 213/941-4900.

National Institute on Park and Grounds Management Eighth Educational Conference, Denver, Colo., **Oct. 29-Nov. 2.** Contact: Erik Madisen, Jr., executive secretary, NIPGM, Executive Offices, National Institute, Box 1936, Appleton, Wisc., 54911, phone: 414/733-2301.

ALCA Design/Build Symposium, Dallas, Tex., **Nov. 8-9.** Call: 703/893-5440.

Eighteenth Annual Missouri Lawn and Turf Conference, Hilton Inn, Columbia, Mo., **Nov. 8-10.** 314/882-7838.

Colorado Annual Pesticide Applicator Workshop, Hilton Inn Airport, Denver, Colo., **Nov. 14-15.** 303/839-2838.

The Irrigation Association Short Course Program, Agricultural Irrigation, Salt Lake City, Utah, **Nov. 14-16.** Call: 301/871-1200.

32nd Annual New York State Turfgrass Conference and Trade Show, The Turf Inn, Albany, N.Y., **Nov. 14-16.** Call: 716/434-5338.

California Landscape Contractors Association Annual Convention, Hyatt Lake Tahoe Hotel, Lake Tahoe, Nev., **Nov. 19-21.** Contact: Mike Leeson, CLCA, 6252 E. Telegraph Road, Los Angeles, Calif., 90040, phone: 213/728-2522.

New Jersey Turfgrass Expo '78, Cherry Hill Hyatt House, New Brunswick, N.J. **Nov. 28-Dec. 1.** Contact: Dr. Henry Indyk, Cook College, Rutgers University, P.O. Box 231, New Brunswick, N.J., 08903, phone: 201/932-9453.

ALCA Maintenance Symposium, San Jose Hyatt House, San Jose, Calif., **Nov. 29-Dec. 1.** Call: 703/893-5440.

Minnesota Nurserymen's Association 53rd Annual Convention, Thunderbird Motel, Bloomington, MN, **Dec. 3-5.** Contact: MNA, 2240 Midland Grove Road, Suite 108, St. Paul, MN 55113.

National Fertilizer Solutions Association, 24th Annual Convention and Chemical/Equipment Exhibition, Georgia World Congress Center, Atlanta, Georgia, **Dec. 4-7.** Call: 309/691-2870.

The Irrigation Association Short Course Program, Turf Irrigation, San Francisco, Calif., **Dec. 5-7.** Call: 301/871-1200.

Ohio Turfgrass Conference and Show, Columbus, Ohio, **Dec. 5-7.** Ohio Turfgrass Foundation, 1827 Neil Avenue, Columbus, Ohio, 43210.

Illinois Turfgrass Conference and Show, Ramada Inn Convention Center, Champaign, Ill., **Dec. 12-14.** Contact: Dr. John R. Street, 106D Horticulture Field Lab, University of Illinois, Urbana-Champaign, Illinois, 61801.

Landscape Design Short Courses, Fisher Auditorium, OARDC, Wooster, Ohio, **Dec. 12-14.** Contact: Fred K. Buscher, Area Extension Center, OARDC, Wooster, Ohio, 44691.

National Arborist Assoication Technical Seminar — Fertilizing Urban Trees, Hyatt Regency O'Hare, Chicago, IL, **Dec. 13-14,** Contact: NAA, 3537 Stratford Road, Wantagh, NY 11793, 516/221-3082.

Maryland Turfgrass Council Turfgrass '79, Baltimore Hilton, Charles Center, Baltimore, MD, **Jan. 8-10.** Contact: Charles Darrah, Dept. of Agronomy, U. of MD, College Park, MD 20742, 301/454-3715.

[illegible]th Nebraska Turfgrass Conference, Nebraska Center, University of Nebraska, Lincoln, Neb., **Jan. 8-10, 1979.** Contact: Dr. R. C. Shearman, Turfgrass Specialist, 105 Plant Industry Bldg., University of Nebraska, Lincoln, Neb., 68583.

48th Annual Winter School for Turf Managers University of Massachusetts, Amherst, Ma., **Jan. 8-Mar. 2, 1979.** Call: 413/545-2353.

The Irrigation Association Short Course Program, Center Pivot Irrigation, Denver, Colorado, **Jan. 9-11, 1979.** Call: 301/871-1200.

Landscape Design Short Courses, Fisher Auditorium, OARDC, Wooster, Ohio, **Jan. 10-12, 1979.** Contact: Fred K. Buscher,

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Area Extension Center, OARDC, Wooster, Ohio, 44691.

New Hampshire Turf Seminar, Sheraton-Wayfarer Motor Inn, Bedford, NH, **Jan. 11-12.** Contact: George Esters, Dept. of Plant Science, University of NH, Durham, NH 03824.

The Irrigation Association Short Course Program, Pumps and Pump Controls, St. Louis, Mo., **Jan. 23-25, 1979.** Call: 301/871-1200.

Southern Weed Science Society 32nd Annual Meeting, Sheraton-Biltmore Hotel, Atlanta, GA, **Jan. 23-25, 1979.** Contact: SWSS, Texas Agricultural Experiment Station, Route 3, Lubbock, TX 79401.

Massachusetts Horticultural Congress, Howard Johnson's 57 Hotel, Boston, Mass., **Jan. 24-25, 1979.** Contact: Deborah Fanning, coordinator, 715 Boylston Street, Boston, Mass., 02116, phone: 617/266-6800.

Mid-Atlantic Agricultural Chemical & Equipment Trade Show, Richmond Arena, Richmond, Va., **Jan. 24-25, 1979.** Contact: N. D. Thomsen, Publicity Chairman, Va. Pesticide Association, Rt. 1, Box 126, Prov. Forge, Va., 23140.

Virginia Turfgrass Conference, Conference Center, Colonial Williamsburg, Williamsburg, Va., **Jan. 24-25, 1979.** Contact: J. F. Shoulders, Dept. of Agronomy, Virginia Polytechnic Institute and State University, Blacksburg, Va., 24061.

15th Annual Northern California Turfgrass & Environmental Landscape Exposition, San Mateo County Fairgrounds, Hall of Flowers, San Mateo, CA, **Jan. 24-25, 1979.** Contact: NCTC, P.O. Box 268, Lafayette, CA 94549, 415/283-6162.

International Society of Arboriculture, Midwestern Chapter Annual Arborist's Seminar, Colony Hotel, 7730 Bonhomme Drive, Clayton, MO, **Jan. 31-Feb. 2, 1979.** Call: 314/863-0400.

ALCA 1979 Annual Meeting & Trade Exhibit, Galleria Plaza Hotel, Houston, Tex., **Feb. 4-9, 1979.** Call: 703/893-5440.

The Irrigation Association Short Course Program, Agricultural Irrigation, Cincinnati, Ohio, **Feb. 6-8, 1979.** Call: 301/871-1200.

New York Turf & Landscape Association Annual Turf & Landscape Conference, Tappan Zee Inn, Mountain View Avenue, Nyack, NY, **Feb. 7, 1979.** Contact: Frank Claps, 136 Laurel Avenue, Larchmont, NY 10538, 914/834-6846.

Wisconsin Arborist Convention, Ramada Inn, Janesville, Wisc., **Feb. 7-8, 1979.** Call: 608/752-0581.

Landscape Design Short Courses, Fisher Auditorium, OARDC, Wooster, Ohio, **Feb. 21-23, 1979.** Contact: Fred K. Buscher, Area Extension Center, OARDC, Wooster, Ohio, 44691.

The Irrigation Association Short Course Program, Turf Irrigation, Calgary, Alberta, Canada, **Mar. 6-8., 1979** Call: 301/871-1200.

Reinders 4th Turf & Irrigation Conference — Equipment Show — Service Clinic, **Mar. 6-8, 1979.** Contact Ed Devinger, Reinders Bros., Inc., 13400 Watertown Plank Rd., Elm Grove, WI 53122, 414/786-3300.

Corrugated Plastic Tubing Association Annual Convention, Pier 66, Ft. Lauderdale, Fla., **Mar. 12-14, 1979.** Contact Robert Lowe, executive secretary, CPTA, 752 Leisure Lane, Greenwood, Ind., 46142, phone: 317/881-4552.

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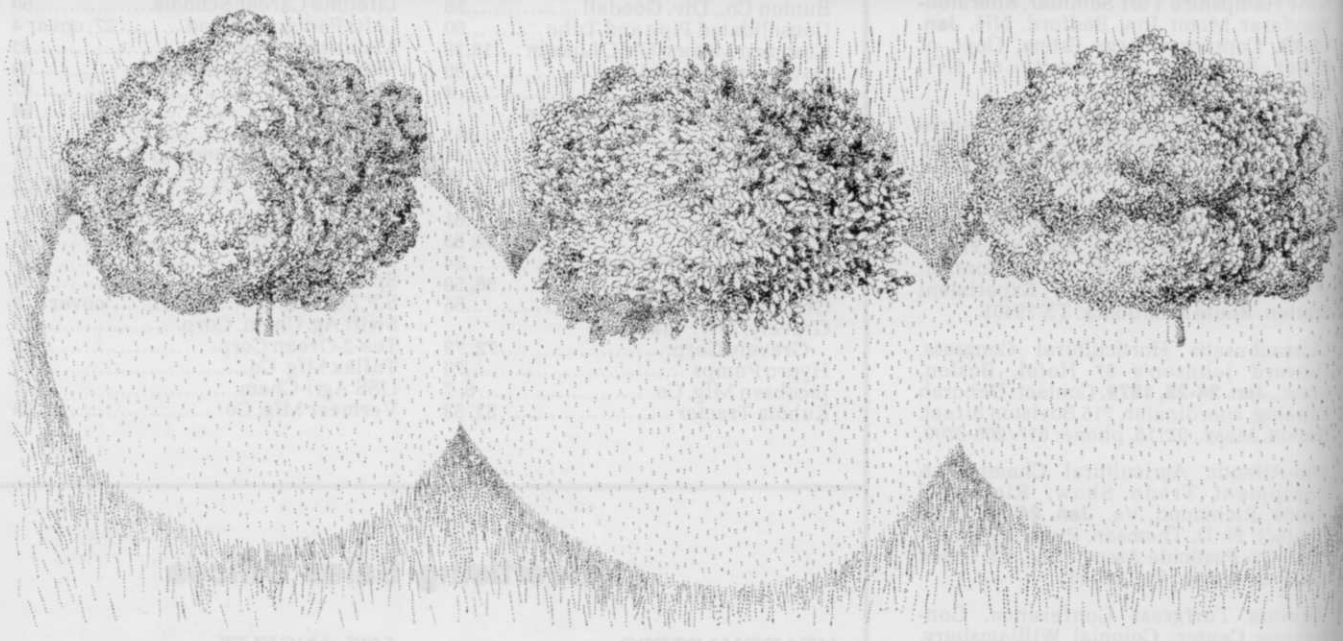

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You see, beneath that impressive rugged exterior, lies an even more impressive interior. Designed to give each and every GMT 9000 a long, lively life.

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You get steady power at low ground speeds to handle the muscle jobs. You also get a choice of seven other speeds for mowing, hauling and rapid transit.

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MORE POWER TO YOU.

The engine itself is another excellent example. A water-cooled 4-cycle, 4-cylinder brute, it delivers 26 HP at 3200 RPM. The engine has an oil filter and is pressure lubricated. The crankshaft is spheroid cast iron, counterweighted, running in three replaceable precision bearings.

The cylinder head is aluminum alloy for lighter weight and better heat dissipation.

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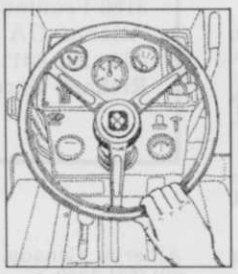

Full-time power steering makes a full day of mowing easy, and practically everything's right before your eyes on the full instrument panel.

The result is an engine that is built last. And last. And last.

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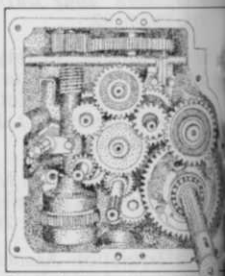
Yet for all the GMT 9000's brute strength, it handles like a pussycat. T instant forward and reverse, by movi one lever, increases maneuverability reduces operator fatigue. And you ha full-time power steering.



Gravely's all-gear direct drive. A transmission with a lot of teeth i

Individual wheel brakes improve steering control. In proper locked position they provide a parking brake for the tractor.

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THINGS ARE TOUGH ALL OVER.

As you've already seen, every possible part of a Gravely is built ext tough to stand up to year after year day-in, day-out grounds maintenance The transmission housing is cast iron

LY GMT 9000.
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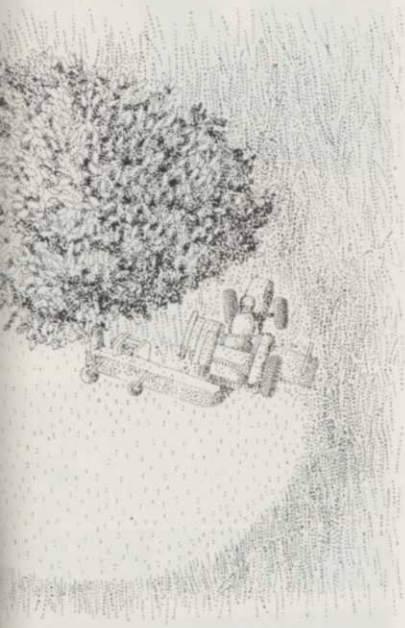

e pivoting front axle is welded steel
onstruction and comes with rugged
ng-pin bushings. Precision bearings
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The Gravely all-gear direct drive
om engine through the transmission
d to the PTOs vastly improves power
ansmission.

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How to keep your tractor from going into hibernation for the winter.

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